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Plating

THE MONTHLY REVIEW OF THE AMERICAN ELECTROPLATERS' SOCIETY

APRIL 1948

Volume 35 No. 4

★

ORGANIC COATINGS FOR METALS

ANALYSIS OF GOLD-ALLOY BATHS

STRIPPING OF ELECTRODEPOSITS

COMPLETE CONTENTS ON PAGE 337

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A CLEPO Cleaner *for* Every Tank Soaking Operation

Metal Being Cleaned	Soil To Be Removed		
	Mineral and Saponifiable Oils and Greases	Sulfurized Oils	Buffing Compounds
Steel	11	10	**13 or 14
Steel, Brass and Copper	12	10	13 or 14
Aluminum and its alloys	*7	9	9 or 14
Zinc-Base Die Castings	7	10	10 or 14
Lead Alloys	7	10	10 or 14

In our new edition of "Clepo Compounds for the Electroplating Industry" there is a complete description of the application of each Clepo Soaking Cleaner.
If you wish to install one of these Clepo materials at your plant, advise us, and we will ship a sufficient quantity—on approval—for production trial. We also will be glad to arrange to have a Clepo Service Man present during the trial run.

*7. Use **Clepo 86-P Cleaner** at 4-6 ounces per gallon and 180°-200° F.
9. Use **Clepo 91-B Cleaner** at 6-8 ounces per gallon and 180°-200° F.
10. Use **Clepo 84 Cleaner** at 4-6 ounces per gallon and 180°-200° F.
11. Use **Clepo 26-E Special Cleaner** at 6-8 ounces per gallon and 180°-200° F.
12. Use **Clepo 36-K Cleaner** at 6-8 ounces per gallon and 180°-200° F.
13. Use **Clepo 84 Cleaner** at 12-16 ounces per gallon and 180°-200° F.
14. Use **Clepo 7-A Solvent** undiluted at 120°-130° F Caution: Do not drag water into solvent as this will decrease its efficiency.

FREDERICK **GUMM** *Chemical Company Inc.*
538 FOREST STREET, KEARNY, N. J.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 202.

THIS ISN'T BIKINI!

INVERT Turn the magazine upside down and you'll see ENTHONE Emulsion Cleaner 75 at work. Emulsified oil, grease and solid dirt are being carried away in water.

A POWERFUL NEW EMULSION CLEANER

. . . Safe for the Plating Room . . .

Emulsion Cleaner 75

ENTHONE Emulsion Cleaner 75 is a new development in emulsifiable solvent cleaner. It possesses the solvent powers of aliphatic hydrocarbons and, at the same time, disperses instantly in water. Used as a pre-soak, its great penetrating powers insure thorough cleaning of recesses and crevices—all oil, grease and solid dirt removed.

Because of its solvent action and penetrability, Emulsion Cleaner 75 quickly removes contaminants which resist alkali cleaning alone. Thus only a short treatment in an alkali cleaner is necessary after the work has been rinsed with running water or a water spray. Emulsion Cleaner 75 supersedes naphtha, kerosene or chlorinated solvents in the cleaning cycle.

Let us help you solve your Plating and Cleaning Problems

10 POINTS for PLATERS

1. Not irritating to throats or hands.
2. Leaves no objectionable odor.
3. Outlasts simple solvents.
4. Not contaminated by oil, grease or buffing compounds.
5. Self-dispersing and quick rinsing.
6. Does not contaminate ALKALI cleaners.
7. Safe for ALL metals.
8. Removes oil, grease, dirt and pigmented drawing compounds from crevices.
9. Speeds the cleaning of steel and replaces alkali cleaning for phosphate treatments.
10. Operates at room temperature 70-90 F.

ENTHONE, INC. Metal Finishing Chemicals . 442 Elm Street, New Haven 2, Conn.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 203.

Industry News

Electrochemical Society Holds Convention in Columbus April 15, 16, 17. Columbus will be host to members of Electrochemical Society during its Annual Spring Convention to be held April 15, 16, and 17 at the Deshler-Wallick Hotel.

The General Committee in charge of arrangements is composed of C. L. Faust, Chairman; F. W. Fink, Assistant Chairman; A. E. Pavlish, Hotel Arrangements; J. Homer Winkler, Entertainment; R. M. Schaffert, Publicity; and C. J. Slunder, Plant Visitation. All these men are members of the staff of Battelle Memorial Institute and will be assisted by members of the Society's local section.

Mrs. J. Homer Winkler will act as chairman of the arrangements Committee for the ladies who attend the convention.

An Advisory Committee, headed by D. J. Demorest, Chairman; J. R. Withrow, both from the faculty of Ohio State University, and H. A. Pray, Battelle Memorial Institute, together with a Finance Committee composed of Clyde E. Williams, Chairman; F. W. Fink and C. L. Faust, Battelle Memorial Institute, and M. G. Fontana, Ohio State University, will assist the General Committee.

The program calls for a luncheon Thursday, April 15, with the annual banquet scheduled in the evening. Friday night a buffet supper plus three hours of entertainment are planned.

Subjects for the technical session will be Rare Metals, Fluorescent Materials, Furnace Refractories, Corrosion and Electrode Processes. Seven papers are slated for the Corrosion session. They are as follows: The Corrosion of Silver in a Saturated Chlorine Atmosphere—Linford and Ford; A Study of Films Isolated from Passive Stainless Steels—Mahla and Neilsen; Inhibition of Steel Corrosion by Sodium Nitrite in Water—Morris Cohen; Corrosion Characteristics of Some Magnesium-Zinc-Calcium Alloys—Kuczynski and Schonfeld; Passivity of Chromium—Hackerman and Marshall; Chromated Protein Films for Protection of Metals—Brenner and Seegmiller; and Rate of Breakdown and Mechanism of Nitrite Inhibition of Steel Corrosion—Cohen and Pyke.

Manufacturing Chemists' Association has announced publication of a manual to guide plant managements in setting up company organizations to handle problems of industrial waste disposal.

Without going into technical details of pollution control, the manual gives step-by-step procedures for determining the extent to which factory control measures may need to be instituted and for organizing waste disposal supervision within companies.

It recommends that waste disposal be brought into the laboratory and made a part of the research that develops new products. It points out also that operation of pilot plants affords management an opportunity to obtain valuable data on the waste produced in the manufacture of a new product as well as ways in which pollution control can be engineered into the design of a new plant before full-scale production begins.

In some cases, it is mandatory to obtain formal approval of plans for treatment works from pollution control authority. War Department approval is necessary on structures projecting into a navigable body of water.

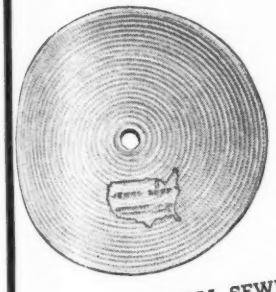
Instrument Conference and Exhibit. The Third Instrument Conference and Exhibit will be held at the Philadelphia Convention Hall, September 13 to 17, 1948.

The Conference and Exhibit is sponsored by the Instrument Society of America with the cooperation of the following: American Institute of Physics, Industrial Instruments and Regulators Committee of the American Society of Mechanical Engineers, and Instruments and Measurements Committee of the American Institute of Electrical Engineers.

-APRIL'S DEPART MENTAL MEMOS-
EGAD, KARZMARSKY, I SEE NO FIGURES ANON FROM OUR SOUTHERN TERRITORY—
ALAS, METHINKS TO BE IS NOT TO BE AS THE ROAR ILL FITS THE MOOD OF THE MODE
EXECUTIVE
-ERE TO WIT TO DROP A HEM IS TO LOSE THE HE AND THE MMM—
OFFICE
FIE UPON FROTHY SPEECHES OF ECONOMIES — ANON I PROMISE-ERE I WISH TO GET SOMETHING FOR MY LAB — I SHALL ACCEPT THE FIRST OFFER —
LAB
AH HA — ALAS, POOR YORICH, I KNEW HIM WELL I INSIST FOR AS HE SPAKE" WHEN I NOD MY HEAD-HIT IT" I COULD NOT RESIST —
SHOP
— I QUESTION YOUR HASTE, SHLOE —
— 'TIS YON TRUCK DRIVER WHO TAUNTS ME WITH CENSORED WORDS - WHERE FOR I TURN ON MY HEEL WITH A HASTY ACID REPROACH —
SHIPPING
DOSTALE

Why? CUSTOMERS Want MORE

Pieced Buffs



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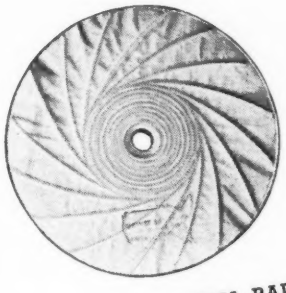

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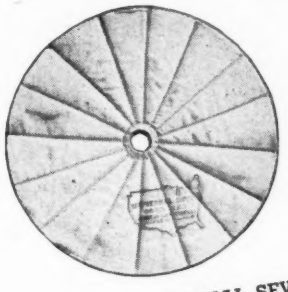

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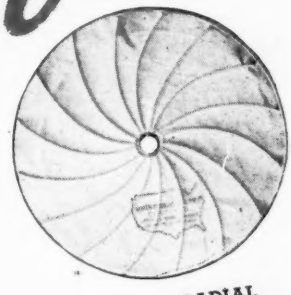

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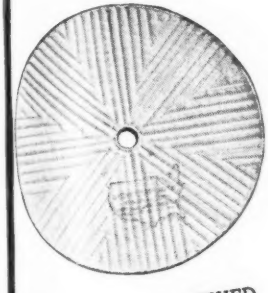

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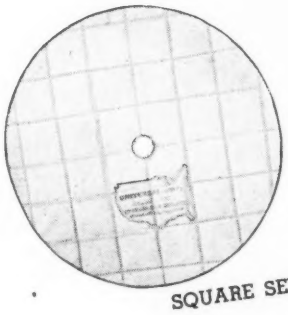

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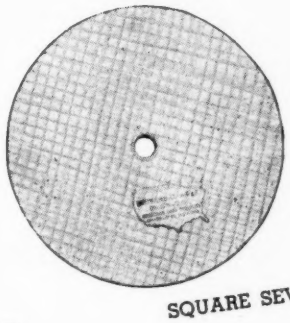
PARALLEL SEWED



SQUARE SEWED

American Buff Company

Chicago, Illinois

2414 South LaSalle Street • Calumet 1607

ADV. BY S. S. LOVITT CO.

THE BEST WAY TO STOP CORROSION IS TO PREVENT ITS START

AND ONE OF THE SUREST WAYS TO PREVENT ITS START IS TO PAINT ALL EXTERIOR EXPOSED SURFACES WITH

Tygon Paint is highly resistant to corrosive penetration through the film.

Tygon Paint resists surface attack by corrosives.

Tygon Primers serve as inhibitors to prevent sub surface corrosion.

Tygon Paint is not an ordinary paint. It is a chemically inert plastic in a solvent vehicle. Applied like paint, it air dries quickly to form a tough, resilient, chemically-resistant film.

Tygon Paint fights off corrosive attack on the surface — through the film — and beneath the film. Properly applied it sticks like a leech. Tygon Paint is not affected by oxidation, handles temperatures up to as high as 210°F.

Write for your free copy of Bulletin 709. 16 pages of technical data, corrosive tables, etc. on Tygon Paint. Write PLASTICS and SYNTHETICS DIVISION, The U. S. Stoneware Co., 1810 Tallmadge Circle, Akron, Ohio.

U. S. STONEWARE

Akron 9, Ohio

Industry News

New Rack Company in the East. Formation of the National Rack Company, with the main plant and office located at 22-06 Morlot Avenue, Fairlawn, N. J., has been announced by E. L. Faulman, President, who pointed out that the majority of rack manufacturing plants are located in the Middle West. It is the hope of this new company to provide the combined advantages of faster delivery and lower transportation costs for electroplating installations in the east.

The company is equipped to manufacture all types of plating racks and to insulate plating racks being made by the customer or other companies. All racks manufactured by the company will be equipped with removable work holders. The insulation is guaranteed for a period of one year of normal use, and it is claimed not to contaminate any electroplating solution nor disintegrate while in use.

Formerly Vice-President of Standard Plating Rack Company in charge of production and sales, Mr. Faulman has previously been connected in a process engineering capacity with the Chrysler Corporation and the Buick Division of the General Motors Corporation.

Above: New home of Frederic B. Stevens, Inc., 1800 Eighteenth Street, at Vernor Highway West, Detroit 16, Michigan.

Electroplating Course Begins at R. I. State College. The new extension course in electroplating sponsored by the Providence-Attleboro Branch of the American Electroplaters' Society got under way on February 19 in the Education Building of the College.

With an enrollment of ninety-six students, the class has been split in two. The instructors are two A. E. S. members, John P. Clarner, Chemical Engineer with Evans Case Company, N. Attleboro, Mass., and Leonard A. Chesworth, Chief Chemist of United Carr Fastener Corporation, Cambridge, Mass.

FOR THE "Top" Black Finish ON IRONS & STEELS USE

JETAL BLACK
JETAL is the original black finish.
JETAL resists wear and penetration better than any black on the market.
JETAL will not chip, peel, crack, crumble or dust off, even on bending or cutting.
JETAL does not change metals dimensionally after application.
JETAL forms a fine base for lacquer, enamel or japan.
JETAL is a black BLACK, deep and solid.
JETAL is tough, long lasting and adaptable.
JETAL is a black oxide coating that is easily and inexpensively applied by immersion for 5 minutes.
JETAL is a tough, speedy blackening for your irons and steels.
JETAL may be resistance or spot welded.
Bring your finishing problem to Alrose for the best economic and scientific solution.
JETAL COSTS LESS and can be applied by immersion in bulk, baskets or barrels.
TO STOP RUST USE JETOIL 1A
JETOIL 1A is an Alrose product that effectively guards against rust. Used as a supplemental oil film after JETAL coating it protects during assembly, inspection, storage or in service; rust is not apparent on such coating until after more than 50 hours salt spray testing.

OTHER ALROSE FINISHES . . .

BLACK

OXIDINE B — for blackening copper and brass.

OXIDINE Z — for blackening zinc.

WHITE

BON WHITE — an immersion tin finish for copper, brass — exceptionally bright white — ideal soldering base.

WHITE BRASS — plates a tertiary alloy of copper, zinc and tin, giving brilliant, non-tarnishing, long-wearing surface over all precious or base metals.

ALROSE CHEMICAL COMPANY

Manufacturing and Research Chemists

PROVIDENCE • RHODE ISLAND • WILLIAMS 3000

Laboratory Model Electronic Timer & Relay, 110V AC.

LAST CHANCE

TO GET YOUR

PERIODIC REVERSER

AT ITS ADVERTISED INTRODUCTORY

PRICE OF **$49.50**

After June 1st the regular price will be $72.00

OUR OTHER PRODUCTS INCLUDE

Dr. L. C. Pan's Control Systems for Analyses of Plating Solutions • Nickelite, a Brightener for Barrel Nickel Solutions • Standard Chemical Reagents—Any Normality • Fine Chemicals and Indicators • Anode Bags • Surface Treatment Specialties.

Free Bulletin and Information Available Upon Request.

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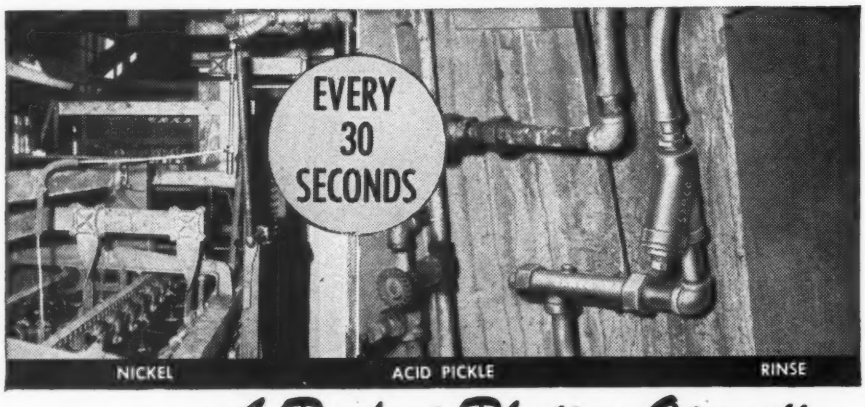
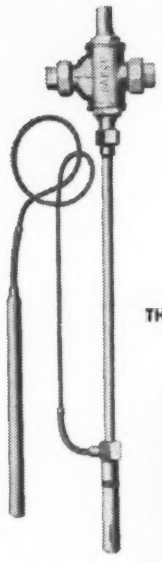


A Perfect Plating Operation



87 THERMOTON

TR-22 CONTROL

Automatic plating units never wait. When they hit the tanks, the temperature must be right and in less than a minute the job must be done—right. In the busy plating plant illustrated, every step is temperature controlled—sometimes with the inexpensive Sarco No. 87 Trap-Control—at others with the more exacting TR-22 control.

The result is mass production with a high accuracy that is repeated, day in and day out. Reduction in the number of rejects paid for these controls in a few months. And the strange thing is that less heat is wasted when perfect plating is secured with Sarco Controls.

Eventually you will find your plant in competition with temperature controlled plating. Why not look into the question now and save the original cost of the controls over and over for years to come? The Sarco Representative near you will be glad to show you how. Ask for Sarco Catalog No. 650 on plating and finishing controls.

186

SARCO SAVES STEAM

SARCO COMPANY, INC.

Represented in Principal Cities

Empire State Building, New York 1, N. Y.

SARCO CANADA LTD., TORONTO 5, ONTARIO

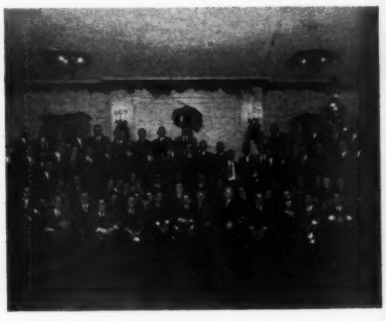
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 209.

Industry News

The Industrial Filter and Pump Manufacturing Company, 1621-1639 West Carroll Avenue, Chicago, Ill., has recently expanded its services to include the vulcanizing of rubber to metal for the protection of tanks, pipe, fittings and related equipment from acid corrosion. This new service includes the furnishing of complete pipes, fittings, tanks, and similar items, as well as the placement of rubber linings and coverings on articles furnished by the customer.

This company has been known for many years throughout the electroplating industry as a manufacturer of filters for electroplating solutions and salt spray equipment.

The Lea Manufacturing Company, Waterbury, Conn., manufacturers of polishing, buffing and burring compositions, gave a combination Christmas and 25th Anniversary Dinner and Party at the Waterbury Country Club to the entire

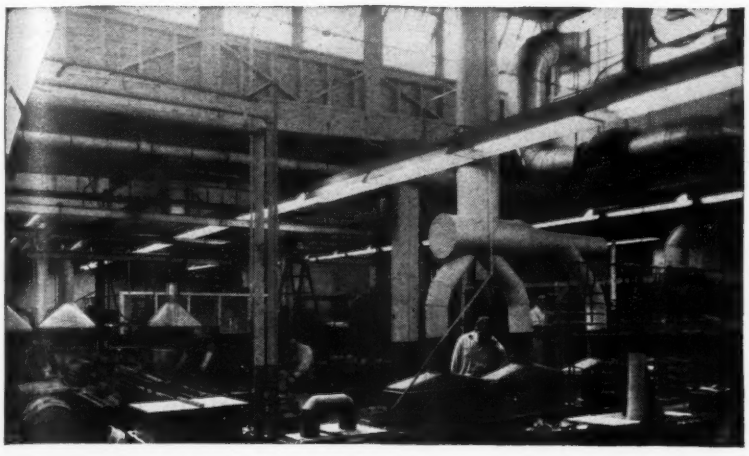


office and production force, numbering some seventy-five people, on December 17. The "old-timers" in the organization were especially honored. Several have been with the company since Bob Leather started it back in 1923, others more than twenty years, and quite a few over fifteen years. Service awards were given out for five, ten, fifteen, twenty and twenty-five year periods of service.

The Udylite Corporation of Detroit a leading manufacturer of plating equipment, recently honored two employees at a special banquet in the Hotel Biltmore, New York, as they joined the company's Twenty Year Service Club. L. K. Lindahl, Udylite president, presented wrist watches set with twenty diamonds to Rosemary Duff of New York, the company's oldest girl employee, and Helen McKay of Detroit, his private secretary, who went to New York for the occasion. In addition, both received the usual 20-year gold pin. The entire staff of Udylite's New York office attended the affair, which included cocktails followed by dinner in the main dining room of the Biltmore.

AMERICAN BOSCH PLANT GETS AUTOMATIC VOLTAGE CONTROL WITH G-E RECTIFIER "PACKAGE"

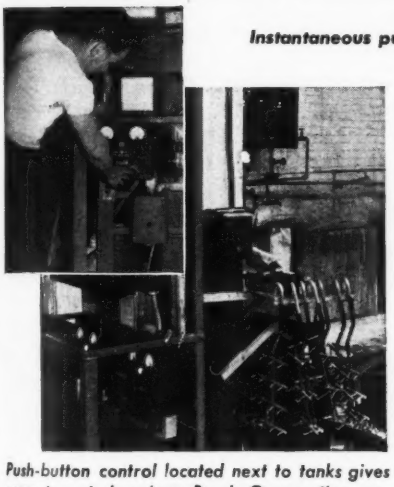
★ ★ ★



General Electric units keep watch over tank conditions 24 hours a day—put flexible, push-button control in plating room, next to tanks

In a move for increased efficiency in plating power equipment, American Bosch Corporation of Springfield, Mass., manufacturer of precision automotive and aircraft equipment, has recently completed installation of an entire new bank of General Electric rectifiers with automatic voltage control. Running on a 24-hour-a-day schedule, this combination of General Electric rectifiers, automatic "on load" controls and operator's control boxes, maintains automatic control over 5,000 amperes of plating current.

With rectifiers and automatic voltage-control units located entirely clear of the plating room, the installation provides easy checks and maintenance of equipment without interruption of plating operations. Operator's control boxes, however, are located where they are needed, right at the tanks, for convenient readings and instantaneous push-button control for necessary changes in voltage. In general, the installation gives flexibility, when and where it is needed, and constant voltage for long, consistent runs.



Instantaneous push-button control of voltage

Push-button control located next to tanks gives operator at American Bosch Corporation on-the-spot control of plating voltage.

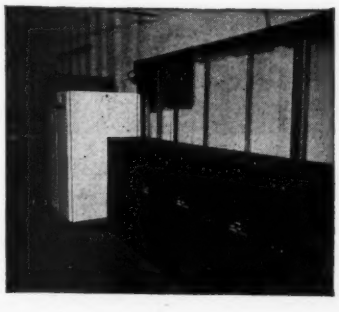
"Start," "stop," "raise," and "lower" buttons on operator's control box give immediate response when changing voltage conditions are required. Operator merely holds button down until necessary voltage is reached. On reaching required voltage, General Electric automatic "on load" induction-type control maintains constant voltage throughout operation. Stepless voltage changes, and no rheostat losses on partial load.

Automatic Operation With "Packaged" "2000" Rectifiers and Controls

Typical automatic "package" consists of the General Electric 12-kw "2000" rectifier in combination with induction-type "on load" rectifier control and operator's control box. The combination automatically maintains output voltage from *no load* to *full load* within ± 2 per cent, gives complete flexibility regardless of load requirements.

Maintenance of units is negligible; efficiency of operation is high. Result: an economical power system with low maintenance cost and with all the convenience needed for the most exacting plating operations.

For assistance in converting your plating shop to General Electric "packaged" power units—or for descriptive data—write to Section A89-458, Appliance and Merchandise Dept., General Electric Co., Bridgeport 2, Connecticut.



GENERAL ELECTRIC

THERE'S A DETREX MACHINE *for Every* METAL-CLEANING APPLICATION

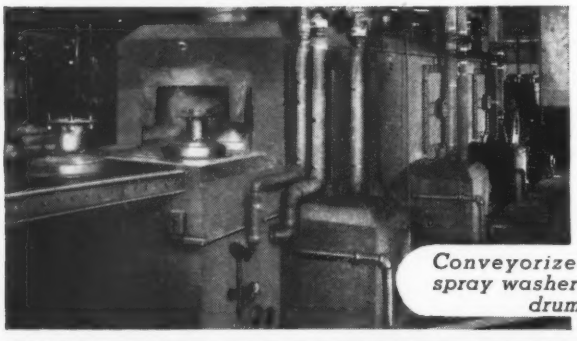
Cleaning small parts in a hand-operated degreaser.

DETREX builds all sizes of hand-operated and conveyorized degreasers and washers for cleaning every kind of metal parts . . . ranging from needles to auto bodies — and with any production volume desired. Work handled includes castings, forgings, tubing, wire and stampings — both of ferrous and non-ferrous metals.

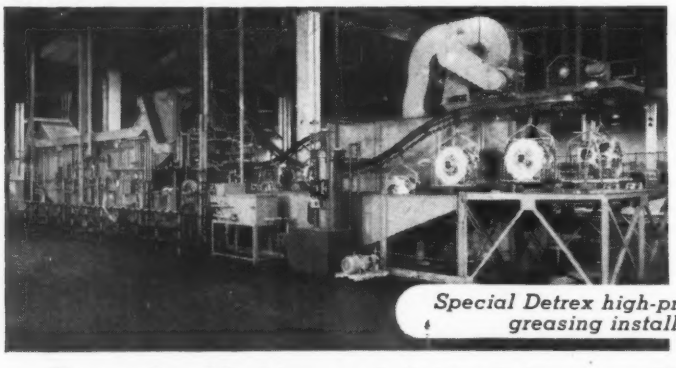
For most jobs, *standard* Detrex machines provide top speed and economy, either used "as is" or with minor modifications. For the really unusual jobs, special machines are designed and built to assure the same top efficiency.

Detrex also supplies the solvent or cleaning compound needed to obtain maximum performance from each machine and top efficiency on *every* metal-cleaning application.

In all cases, the machines and cleaning compounds are backed by a nationwide field organization. Consult your Detrex field representative.



Conveyorized three-stage alkali spray washer cleaning truck brake drum assemblies.



Special Detrex high-production degreasing installation.

Degreasing Machines and Safety Solvents • Metal Parts Washers • Alkali and Emulsion Cleaners and Strippers • Processing Equipment • Spray Booth Compounds

SA 3-48

DETREX *Corporation*

DETROIT 32, MICHIGAN

Industry News

A. S. T. M. Committee B-8 on Electrodeposited Metallic Coatings and its Sub-Committees and Sections met in Washington, D. C., on March 4 and 5.

Sub-Committee I, Dr. J. E. Stareck, Chairman, on Specifications, Papers and Definitions, will review existing tentative specifications for plated coatings to see that they conform with current best practice and will sponsor participation in a Symposium on Bearings to be held in 1949, with Dr. R. A. Schaefer as its representative on the Symposium Committee.

Sub-Committee II, under the chairmanship of Dr. H. A. Pray, discussed and accepted in principle a modified rating procedure for outdoor test panels of copper-nickel-chromium on steel submitted by Mr. F. L. La Que and based on comparisons with photographic standards. It will cooperate in the exposure tests of panels to be submitted by A. E. S. Research Project No. 4 on Effect of Surface Finishing of Non-Ferrous Base Metals on the Protective Value of Plated Coatings.

Sub-Committee III on Conformance Tests, Dr. W. A. Wesley, Chairman, will review A. S. T. M. Designation A-219 through its Section 1 on Thickness Tests of which A. H. Du Rose is Chairman. Section 2 under A. Mendizza will begin a study of some existing porosity tests to determine their reproducibility. Section 3 under E. J. Roehl will study microhardness tests and the applicability of the Jacquet adhesion test to commercial products. Section 4 on Luster Tests was organized under the chairmanship of George Jernstedt and listened to explanatory discussions by representatives of leading optical instrument manufacturers.

Sub-Committee IV on Electroplating Practice, Frank K. Savage, Chairman, has completed a draft of a Recommended Practice for Preparation of High-Carbon Steel for Electroplating which is now being circulated among the members of the section responsible for it (Dr. R. M. Wick, Chairman) and has begun accumulating information for drafting a Recommended Practice for Preparation of Zinc Base Alloy Die Castings for Electroplating. It decided to proceed with the writing of similar recommended practices for preparation of stainless steels and of copper alloys and to determine if one can be written about the preparation of aluminum and its alloys.

Sub-Committee V on Supplementary Treatments for Metallic Coatings, Mark Darrin, Chairman, will review the Tentative Specifications for Chromate Finishes on Electrodeposited Zinc, etc., through a section under the chairmanship of Gustaf Soderberg. It will also investigate the possibility of writing speci-

Buffing composition adheres to the face of the CODMAN *VENTILATED NON-FRAY BUFF at both high and low speeds due to its remarkable heat elimination properties and flexible pockets.

Pockets in the face of the "Non-Fray" collect and hold compound through any operation. This adds up to faster cutting or buffing . . . and greater profits.

For buffs that are rugged . . . for buffs that live longer . . . for buffs that work harder—

consult CODMAN, The Greatest Name in Buffs.

*Patent Nos. 2,027,863; 2,094,650 1,573,961; Re. 19,894; 2,140,280

BUFFING AND POLISHING WHEELS FOR EVERY OPERATION

F.L.&J.C.
CODMAN
COMPANY
ROCKLAND · MASSACHUSETTS

BRANCH OFFICES
DETROIT
LOS ANGELES
PHILADELPHIA
GRAND RAPIDS

THE NATION STANDS a good chance of slipping on a living room rug and falling flat on its face, if a safety survey of a half-million school children is any indication.

Conducted by the Greater New York Safety Council, the survey gave the youngsters a series of safety situations to check—to see if they were followed in individual homes. Number one hazard, among those listed, was small rugs on slippery floors, not tacked down and not made skidproof.

Last year the survey—one of the largest conducted in the country — showed the ... was improper ... mable materia... line, kerosene a...

Second most ... the children sai... bers of their ... doors and bure... diately after y... surprising nu... ies, the safety...

In third pla... mable liquids ... ing, and in the ... of sturdy bases ... on when reach...

Families w... in leaving ma... small children...

The childre... windows unsc... could fall out)... ported a bump... electric cords ... starters.

EXPENDITURES for maintenance and repair of existing buildings are expected to total about $6 billion in 1948, about the same figure as in 1947, according to a forecast prepared by the economists of Producers' Council, David S. Miller, Council president, stated today. The Producers' Council, Inc., is a national organization of manufacturers of building materials and equipment.

"With repair work included, the total volume of all building next year, including new construction, is expected to approximate $20 billion," Dr. Mill... said.

The coa... 000 gallon... and used ... said. The ... has been ... the use o... cubic fee... kitchen ra...

The co... the U. S. ... tankers t... oil here ... bought in ... company ... being pro... Coast.

City Ice ... ge at ... compa... of 500,... plant. ... e mo...

Seeg... ts said t... ny sudde... be a sl... season...

la's mo... more ... whistle... d villa... n oil ... Warren ... ported ... 41 belo... he Stat... le, a tin... 35 belo... ton Stat... d an u... below ... In Willi...

y. ... the M... s of ice ... of coal. ...

n in ... ted that ... least fi... he ice a...

sure ... hrough... ty with... h at th... with fr...

ast, te... elow fr... g but ...

above/ ... rowded.

es ...

re tak... morrow ... cere... ving of ... ent in ...

ongress ... nuel C. ... itizens ... st Co., ... 's 7th ...

e. ... at Inde... featured ...

Explosion ... Down Base...

A heater e... the basement a...

Mrs. Reec... out of her cha... on the first ... foot of the ... floor. A phy... bruises and sh...

The oil heate... blast knocke... between the b... and tore the g... hinges. The ki... ripped loose.

The dining ... knocking over ... were called, b... flames.

Jap Croc... First Ti...

Ship manifes... Maritime Exch... the arrival he... ware for the ... war.

The Norwe... brought 30 ca... well as 32 cas... necklaces.

The British ... brought 4,500 cases of sheet rubber from Batavia, Netherlands East Indies.

... disastrous armory fire more than 10 years ago.

Emergency squads of police were summoned to handle spectators who

Zorball cleans up local trouble spots

There's one safe, certain answer to the dangerous grease and oil spots you find around machines and on plant floors. It's ***Wyandotte Zorball,*** the all-purpose floor absorbent.

Zorball is easy and economical to use. A thin layer of this granular product absorbs oil, grease, water, paints and other liquids quickly and completely. It provides an immediate anti-slip surface underfoot.

Even when saturated, ***Zorball*** retains its original form. There's no caking, packing nor forming of "mud" to be tracked around the shop. It will not injure fabrics, wood, metals, rubber, or the skin of those who handle it.

Furthermore—and this is important—***Zorball*** helps prevent fire hazards. It is chemically inert and nonflammable . . . resists combustion even when oil-soaked.

Wyandotte Zorball is listed by Underwriters' Laboratories.

Ask your nearest Wyandotte Representative for complete information on ***Zorball.*** All you have to do is give him a call.

Trouble afoot?
Why not try
WYANDOTTE
ZORBALL

Wyandotte
REG. U. S. PAT. OFF.

WYANDOTTE CHEMICALS CORPORATION
WYANDOTTE, MICHIGAN • SERVICE REPRESENTATIVES IN 88 CITIES

Industry News

fications for phosphate treatments of zinc surfaces.

The present officers of the Committee, C. H. Sample, Chairman, Gustaf Soderberg, Vice-Chairman, and Dr. R. B. Saltonstall, Secretary, were renominated for another two-year term.

WANTED
EXPERIENCED SALESMEN AND DISTRIBUTORS FOR BUFFING COMPOUNDS

Salesmen and distributors wanted for several good territories. Requirements are as follows: Must now be selling a line of buffiing compounds and want to make a change, or have sold compounds in the past. We prefer a man who has one or more lines now and is selling the trade. Ours is a good reliable company, with plenty of experience and knowledge when it comes to manufacturing buffiing compounds. State experience and lines now handled. Our employes know of this advertisement. *Address:*

P-4A, PLATING
P. O. Box 168, Jenkintown, Pa.

SALESMAN WANTED
Nationally known manufacturer has opening for a man with a thorough knowledge of polishing and buffing equipment, wheels, compositions, etc. Previous sales experience desirable. Must be free to travel. State age, experience, and salary expected. *Reply to:*

P-4B, PLATING
P. O. Box 168, Jenkintown, Pa.

PLATING FOREMAN
Young, chemically trained man experienced in industrial finishing of brass, steel, aluminum and zinc on small parts. Take full charge of plating, polishing and paint shop of reputable manufacturer in Philadelphia industrial area. Ample opportunity for progressive man. Write fully, in confidence, including salary required. *Reply to:*

P-4C, PLATING
P. O. Box 168, Jenkintown, Pa.

INDUSTRIAL SALESMEN
National organization offers permanent sales positions with salary, commission, expenses. Should have industrial selling experience and know metal finishing processes such as electro plating, painting, metal cleaning, etc. Need men in Chicago, Dayton, Ohio, and Rockford, Illinois areas. Thorough training given at our expense. Must have car in good condition. Write fully giving all educational and business details.

Reply to:

4-D, PLATING
P. O. Box 168, Jenkintown, Pa.

Belke
TIME-SAVER PLATING RACKS

Section of BELKE Rack with Auxiliary Anode for Chromium Plating shower spray parts. Three point contact tips hold part in correct relation to Auxiliary Anode, assuring uniform chrome deposit on inside surface. Racking and unracking are fast and easy.

For High Plating Efficiency

Efficient racking saves you plenty! Gives you bigger production—and better plating results with less handling. That is why BELKE Experience, BELKE Know-How and BELKE Facilities put extra value beyond measure into plating racks.

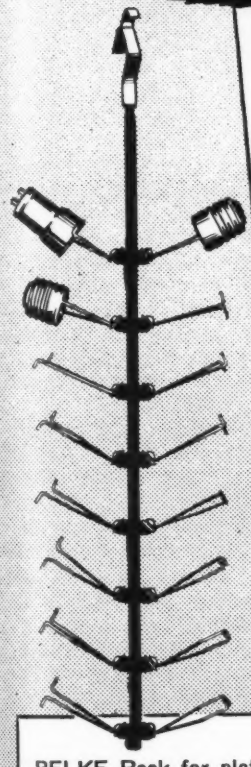
For example, BELKE Methods of applying Modern Rack Insulations make it possible to run work thru the entire cleaning and plating cycle with but one racking. *Think of it! Racks that stand up in copper, nickel, chrome, cadmium, zinc and all other plating and cleaning solutions, including trichlorethylene degreasing.*

BELKE Experience and Specialized Facilities are available to provide the exact insulation best suited for your needs.

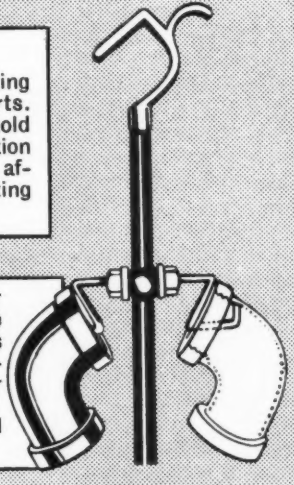
Whatever your racking requirements, just send specifications with dimensional sketch or sample part for the BELKE Recommendation.

The Most Complete Rack Manual Ever Produced

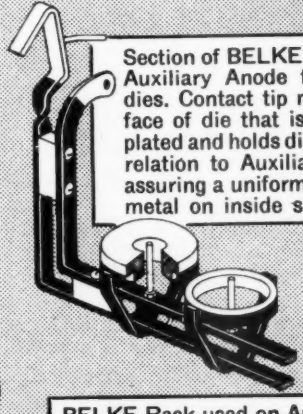
100 pages of experience-proved information. Practical construction methods. Insulations. 560 Proven Designs of Racks, Tips and Hooks. 144 illustrations of Racking Methods—shows how to rack all shapes and sizes from jewelry to bumper bars. Price $5.00 postpaid.



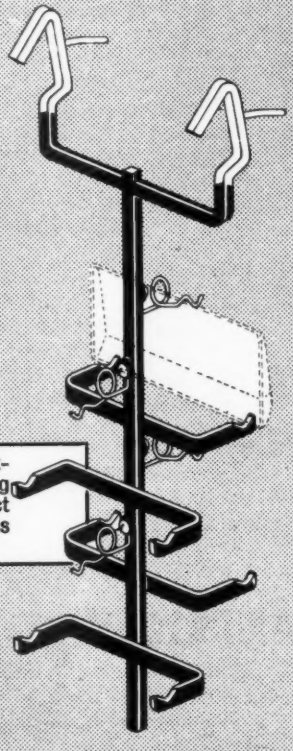
BELKE Rack for plating electrical socket parts. Spring contact tips hold parts in correct position for good drainage and afford fast and easy racking and unracking.



BELKE Rack for plating water pipe elbows. Special tips hold elbows in correct position for good drainage Racking is fast and easy.



Section of BELKE Rack with Auxiliary Anode for plating dies. Contact tip masks surface of die that is not to be plated and holds die in correct relation to Auxiliary Anode, assuring a uniform deposit of metal on inside surface.



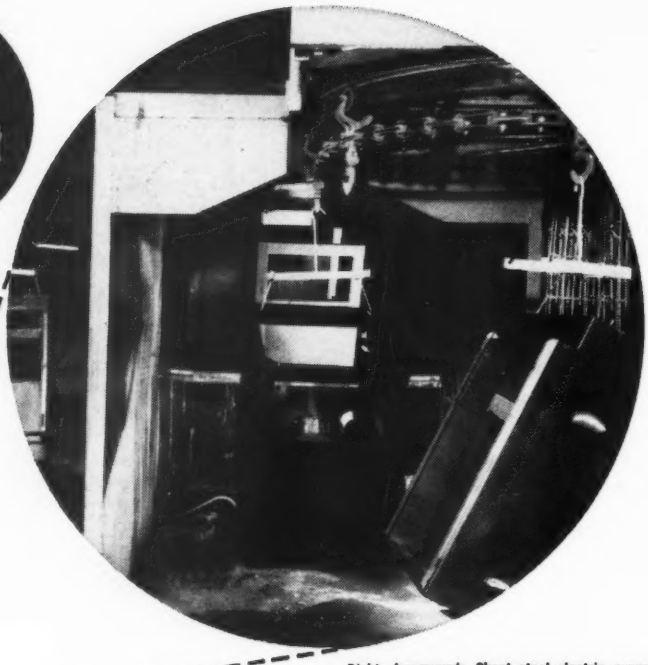
BELKE Rack used on Automatic Plating Machine for Chromium Plating Broiler Covers. Cover is held in correct position for good drainage and gas elimination.

BELKE MANUFACTURING COMPANY

947 North Cicero Ave Chicago 51, Illinois

EVERYTHING FOR PLATING PLANTS

In the Spotlight



Right, foreground: Sheet steel electric range shells entering power spray washer to be cleaned and phosphate-coated with "DURIDINE".
Left: DURIDIZED shells, well conditioned for bonding paint, leaving washer.
Photograph courtesy of Hotpoint, Inc.

Duridize FOR A LASTING PAINT FINISH ON YOUR PRODUCT

CHEMICALS ACP PROCESSES

RUST PROOFING AND PAINT BONDING
Granodine *
Duridine *
Alodine *
Lithoform *
Thermoil-Granodine *

RUST REMOVING AND PREVENTING
Deoxidine *
Peroline *

PICKLING ACID INHIBITORS
Rodine *®

Duridizing is very effective on all metals. The process is simple to control —uses a single chemical, "DURIDINE", which combines cleaning and phosphate coating—requires only mild steel power spray washers. Duridizing is equally suited to plants operating on full scale large production; and to plants faced with intermittent production.

"DURIDINE" is made, sold and serviced by a pioneer in the field of rust proofing.

Pioneering Research and Development Since 1914

AMERICAN CHEMICAL PAINT COMPANY

AMBLER, PA.

Manufacturers of Metallurgical, Agricultural and Pharmaceutical Chemicals

Personals

Thomas A. Boaz, who travelled Ontario, Canada, for the F. B. Stevens Company for some years, then went into the plating business for himself, has now gone back to his first love as superintendent of plating and polishing at Canada Cycle and Motor, Toronto.

Moore

Clark Moore has been appointed Manager of Sales for Optimus Detergents Company, Matawan, N. J. He brings to Optimus a wealth of experience in the sale of industrial products. Prior to joining Optimus, he was sales manager of the asphalt paving and industrial sales divisions of the Barber Asphalt Corporation. During the war period, Mr. Moore was with the New York Office of the War Production Board as Chief Engineer. He later went with the Smaller War Plants Corporation as Assistant Regional Deputy Director. Previous to his work with the Government, he had been President and General Manager of the Equitable Asphalt Maintenance Corporation of Kansas City, Mo., manufacturers of highway equipment.

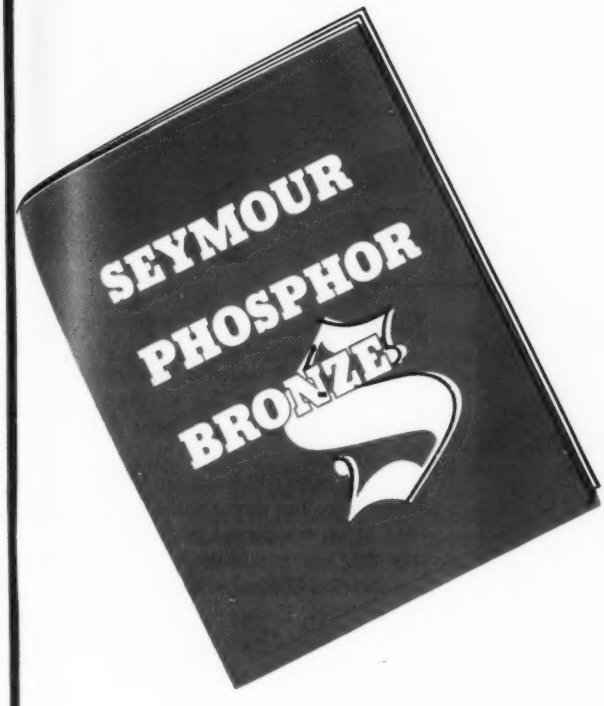
John J. Hart, Jr., has been named sales manager of a recently formed division of The Watson-Standard Company, Pittsburgh, according to an announcement by Henry K. Watson, II. This division will service a new line of safety finish products for industry. Mr. Hart comes to Watson-Standard from the Lake Erie Engineering Corporation where he served as district sales representative and later as assistant manager of that firm's Feller Engineering Division. A graduate of Princeton University, he was associated with the Schloemann Engineering Corporation as sales engineer from 1940 to 1945.

Douglas Hannah has been appointed chief chemist of Canadian Hanson & Van Winkle Company, Silver and Morrow Avenues, Toronto 3, supplier to the Canadian plating industry.

Want to Know More About

NICKEL SILVER?

The answers to your questions on composition, specifications, tolerances, properties and characteristics are all contained in Seymour's latest, up-to-the-minute Nickel Silver catalog. It is an invaluable aid to the design engineer, production staff and purchasing department. This informative guide shows by chart and illustration the widespread applications and usefulness of the most important commercial alloys. Write for your copy today.



--PHOSPHOR BRONZE?

To manufacturers of electrical appliances, springs, stampings, bearings, etc., Seymour's Phosphor Bronze catalog provides long awaited data. A comparison of the leading Phosphor Bronze alloys, with complete specifications and properties, ensures the proper choice of alloy for each particular application. For the latest word on Phosphor Bronze, simply fill out and mail the coupon below. Your copy will be sent promptly.

NICKEL ANODES

Seymour Nickel Anodes, in all standard sizes, or made to your own design, are available in a number of special types. Complete descriptions of these outstanding anodes will be mailed immediately on request.

BRIGHT NICKEL

Seymour Bright Nickel, a hot organic process used with standard Watts bath, saves production costs by eliminating the need for buffing and polishing prior to chromium plating. Technical data and detailed descriptions are available for your consideration.

THE SEYMOUR MANUFACTURING COMPANY, SEYMOUR, CONNECTICUT
NONFERROUS ALLOYS SINCE 1868

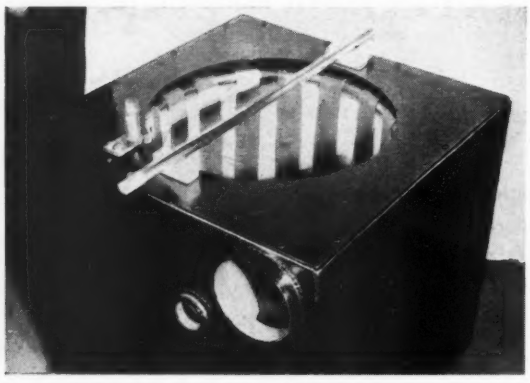
Gentlemen: Please send complete information on the items checked.

☐ SEYMOUR NICKEL SILVER ☐ SEYMOUR PHOSPHOR BRONZE

☐ SEYMOUR NICKEL ANODES ☐ SEYMOUR BRIGHT NICKEL

Company Name.....Attention of.....

Address.....



Left—a solid lead tank, of ¼-inch thick lead, with corners strengthened by Storts post-of-metal weld construction. Right—a lead lined hard chrome plating tank for plating cylindrical shapes

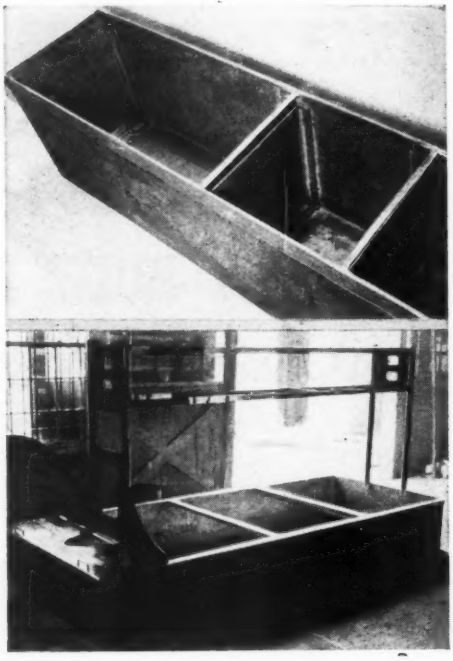
CUT YOUR CORROSION COSTS—

ADD YEARS TO THE LIFE OF YOUR TANKS

with lead linings

fabricated by

STORTS



LEAD linings protect your tanks from corrosion, prolong the life of your tanks and prevent the formation of rust that tends to circulate and contaminate your acid solutions.

Storts can furnish lead lined tanks of simple design or the more complex partition type tanks—also coils, aprons and exhaust hoods.

Above—a lead lined tank with two partitions between compartments to provide heat insulating air space. Below—a lead lined tank with special mount for recirculating pump

The long life performance of Storts lead lined tanks starts with sound design and correct welding procedures on the steel body. Your final satisfaction is assured by having all lead work done in the Storts lead welding shop by experienced specialists in lead fabrication.

STORTS WELDING COMPANY
INCORPORATED

42 Stone Street Meriden, Conn.

Manufacturers of Welded Fabrications to Specifications

Personals

L. P. Holladay III has been appointed manager of sales development in the Chlorine Products Division of the du Pont Company's Electrochemicals Department. Mr. Holladay, who started with the company in 1934 as a chemist in the analytical laboratory of the Philadelphia plant of the Grasselli Chemicals Department, will be concerned with sales of perchloroethylene, trichloroethylene, methyl chloride, methylene chloride and chloroform. He received his Ch.E. and B.S. degrees from M. I. T. in 1934 and two months later joined du Pont.

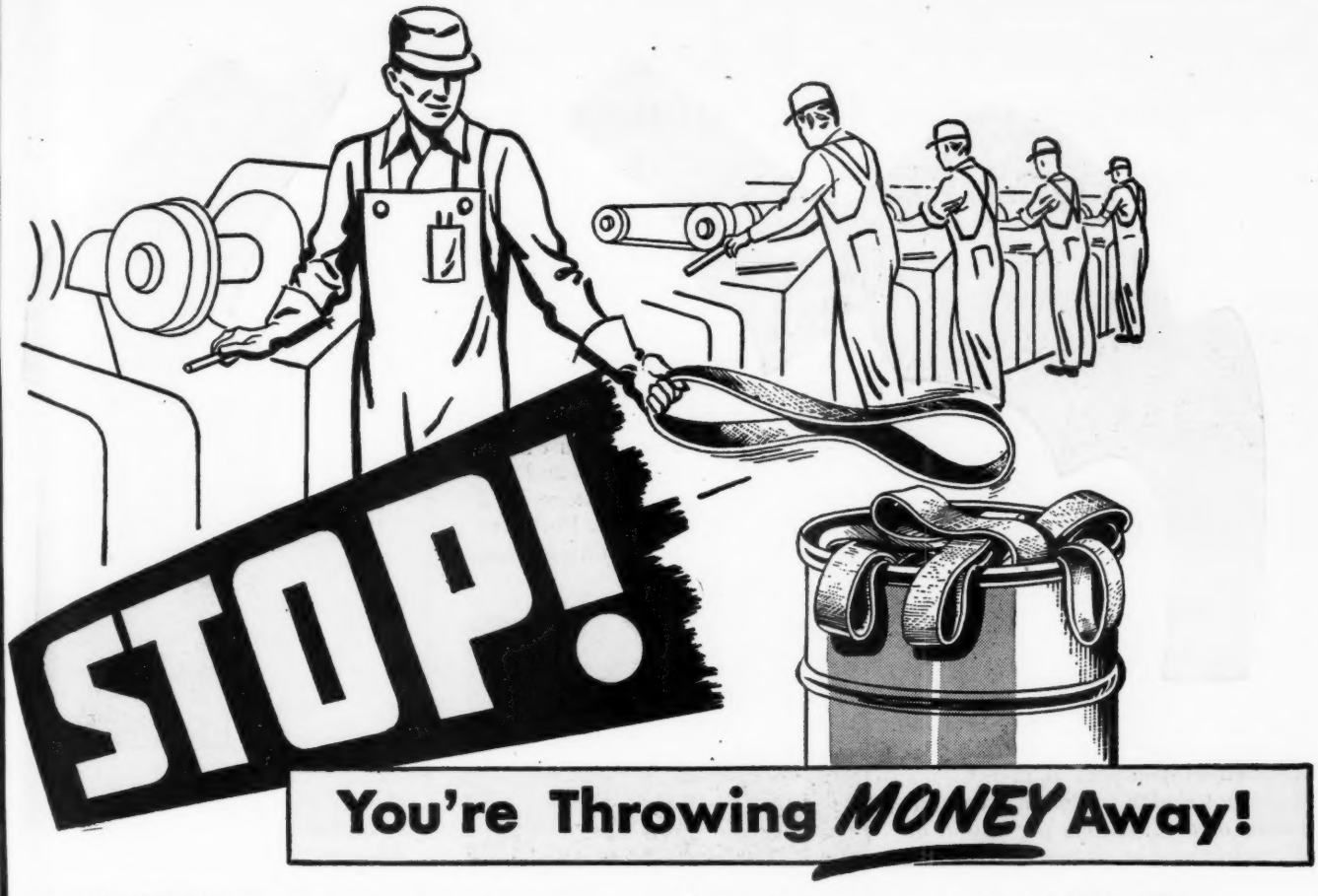
Young

William Young has been appointed Udylite representative in the Cincinnati territory, which includes most of southern Ohio, according to L. V. Nagle, Vice-President and Sales Manager of Udylite Corporation.

Young, who will work out of the Cleveland office, has been with Udylite since 1944 as an equipment engineer. Prior to this he was associated with Chrysler Corporation in Evansville, Ind., the Great Lakes Steel Company in Detroit, and National Tube Company of Lorain, Ohio, over a fifteen-year period.

Robert M. Norton, who has been the New York State Manager of the Hanson-Van Winkle-Munning Company, with headquarters in Skaneateles, has been transferred to the company headquarters in Matawan, N. J., where he will be engaged in sales promotional activities in the sale of electroplating and polishing equipment and supplies. Mr. Norton has been with the company for a number of years. He is a graduate of Dartmouth College and has taken special courses in chemistry at Rutgers University.

Dr. C. Fred Gurnham, until recently with Whitney Blake Company of Hamden, Conn., where he designed, built and operated a continuous multiple-wire electroplating department, has entered the consulting field and opened offices at 72 Lake Street, Hamden, Conn. He plans to take on all chemical engineering work and will specialize in electroplating, waste disposal, and chemical manufacture.



You're Throwing *MONEY* Away!

YES! IT'S TRUE! If you are throwing away worn abrasive belts *without re-coating them,* you are throwing MONEY away!

SAVE OVER 80%

Actually, you can save over 80% of your expenditures for new abrasive belts by re-coating your worn belts with GRIPMASTER Polishing Cement. *Leading plants report:* "In most cases, the cost of re-coating with GRIPMASTER is *less than* 20% of the cost of new belts!"

Any belt—regardless of size—can be re-coated perfectly with GRIPMASTER *in minutes!* No special equipment needed. And you can re-coat any belt over and over again!

INCREASE PRODUCTION, TOO

You'll not only be money ahead on "belt cost" savings when you re-coat with GRIPMASTER—but you'll be *profits* ahead on increased production efficiency. Check these dollars-and-cents advantages you'll enjoy when you use GRIPMASTER:

- Special high-heat resisting ingredient gives longer life to each coating.
- No belt blisters.
- Grains of emery are *locked in* with vise-tight control.
- Greater flexibility gives more and finer "breaks" when belt is cracked.
- GRIPMASTER'S *one* grade grips *all* grains—300 to 20.
- No special sizer necessary. GRIPMASTER serves as both sizer and cement.
- Ideal results on *all* metals . . . ferrous and non-ferrous . . . plastics, too.
- No obnoxious odors. GRIPMASTER is odor-free!

Discover these benefits for yourself now. Send for generous free sample *today.* You'll be glad you did!

FOR GREATER POLISHING PROFITS . . .

GRIPMASTER
PATENTED
POLISHING CEMENT

for ✓ ABRASIVE BELTS
✓ POLISHING WHEELS
✓ DISCS

FREE GENEROUS SAMPLE

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NELSON CHEMICALS CORPORATION
12345 Schaefer Hwy.,
Detroit 27, Mich., U.S.A.

IN CANADA:
H. C. Nelson Chemicals, Ltd.
Windsor, Ontario

☐ Send us a generous FREE SAMPLE of Gripmaster.
☐ Send special data on how to save money by re-coating worn belts.
☐ Have a representative call to demonstrate.

COMPANY_____

ATTENTION_____

ADDRESS_____

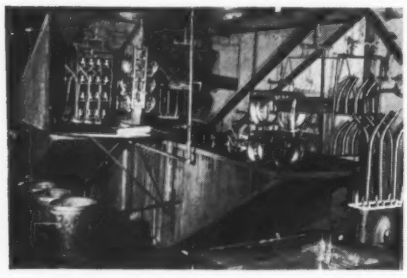
CITY_____STATE_____

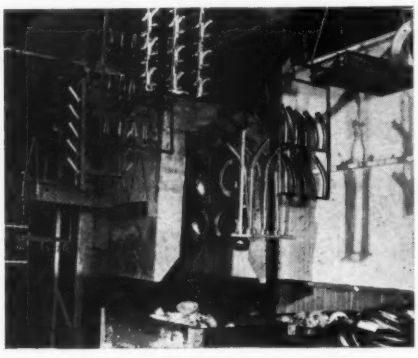
P-4

ADVERTISEMENT

Special Magnus Cleaning Machine Doubles Output with Half the Labor

The 412 component parts of a famous vacuum cleaner are now all cleaned in this special seven-stage Magnus Cleaning Machine. Greasy, dirty parts are loaded on conveyor racks and passed through the machine. The first two stages provide precleaning in Magnusol (Emulso-Dip process and draining). The next stage knocks off loosened dirt with a 40-lb. pressure cold water spray. The fourth stage is a spray wash in mild Magnus alkaline cleaner at 180° F., followed by a hot water spray rinse. Step six is a cold air blast to remove clinging water particles and prevent spotting. The final stage is a drying chamber at 200° F. Parts are then conveyed to the painting or plating operation.





Under the former hand cleaning method, parts were not anywhere nearly as well cleaned, and eight men were required for the job. With the Magnus Machine, four men turn out twice the former output, with almost complete elimination of rejects due to poor cleaning.

Is Sludge Cramping Your Oil Burning Style?

If you burn heavy oil in any of your heat operations where steady heat input and accurate temperature control are essential, you need Magnus Clerex to prevent sludge troubles. A concentration of a few drops per gallon of oil, maintained in all new oil charged in your storage tanks, will *prevent* sludge from forming.

A slightly heavier concentration in the oil of any badly sludged tank will *dissipate* the sludge throughout the oil in a *completely* burnable condition.

Barrel De-burring Offers You Worthwhile Savings

If you do volume de-burring, particularly on work involving close tolerances, the superior results achieved by using a suitable lubricant is worth investigating. Some really remarkable economies have resulted from the use of Magnus solvent soap lubricants carefully fitted to the individual parts to be de-burred.

Magnus Chemical Company, 41 South Avenue, Garwood, N. J. In Canada — Magnus Chemicals, Ltd., 4040 Rue Masson, Montreal 36, Que. Service representatives in principal cities.

NEW CLEANING IDEAS

For Further Details Write Magnus

•

For Highly Flexible Utility Cleaning . . . investigate Magnus Aja-Dip Cleaning Machines. Speedier and better cleaning than by any other method. Made in types and sizes to meet your particular requirements. No. 151

•

New Combination for Removing Slushing Oils . . . Liquid Heavy Duty Magnus Alkaline Cleaner 61K is highly effective in the removal of slushing oils. But when you add just ½ oz. per gal. of NXL—the Magnus super wetting agent—you add greatly to the cleaning speed and quality of the solution. No. 152

•

Ask for Details on Magnus Water Wash for more effective operation of water curtain for paint spray booth systems. Eliminates foaming and clogging troubles due to free paint in the curtain. No. 153

•

When You Want to Remove Tripoli or Rouge, turn to Magnus #7. Equally effective on jewelry, nickel silver, silverware and aluminum. No. 154

IN METAL CLEANING IT'S **Magnus**

CLEANERS • EQUIPMENT • METHODS

Personals

Dr. Gurnham, who has a D.Eng.Sc. degree from New York University and is a licensed professional engineer in Connecticut and New York, has been active in a number of technical societies, among them American Chemical Society, The Electrochemical Society and American Electroplaters' Society. He is a Vice-President of the A. E. S. New Haven Branch, Vice-Chairman of the A. E. S. Research Directing Sub-Committee and Chairman of its Project Committee No. 10 on Waste Disposal.

Ruleff

Robert Ruleff has been placed in charge of the Dayton, Ohio office of The Gilbert Tramer Company, manufacturers of polishing and plating equipment, 402 Swetland Building, Cleveland 15, Ohio. The Dayton branch, which is located at 830 Gas and Electric Building, serves the southern Ohio territory.

Mr. Ruleff received a B.S. in Chemical Engineering from the University of Pennsylvania in 1942. He is a member of the American Electroplaters' Society, American Chemical Society and the American Society for Metals. Mr. Ruleff will carry out the company policy of offering engineering and planning service on the installation of all polishing and plating equipment.

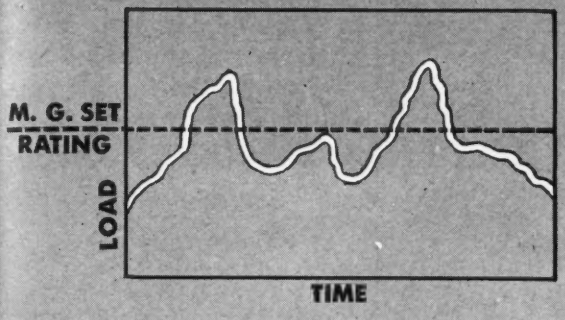
O. B. Wilson has been named Industrial Manager for the Eastern sales region of the Brown Instrument Division of Minneapolis-Honeywell Regulator Company. His promotion will make him Regional Manager of the territory extending from northern Virginia, through eastern Pennsylvania, to the Canadian border, west to Rochester, N. Y., and in New England.

Wilson, who has been with the Honeywell-Brown organization for the past twenty-five years, will continue to make his headquarters in New York City where he has been the Brown manager for the past two years.

Ray W. Christensen has been appointed Assistant Advertising Manager of the Aluminum Division, Reynolds Metals Company, Louisville 1, Ky., according to an announcement by David F. Beard, Advertising Manager. He succeeds James C. Bjorkholm, who was recently advanced

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 219.

ELECTROPLATING FUNDAMENTALS— how reserve capacity affects plating costs



E. P. Motor-Generators safely handle short-time overloads.

"Reserve Capacity" means that Electroplaters get more amperes per dollar from E. P. Motor-Generators. These MG Sets provide an effective ampere capacity at least one-third greater than their nameplate ratings.

The typical electroplating shop load curve to the left illustrates the importance of this feature. By taking advantage of Reserve Capacity, you can safely select a Motor-Generator with a rating of only 75% of the peak loads.

First cost of the equipment will be reduced proportionately. Operating costs will be lower. Plating efficiency will be increased.

E. P. Motor-Generators are conservatively designed to provide more value for less overall cost.

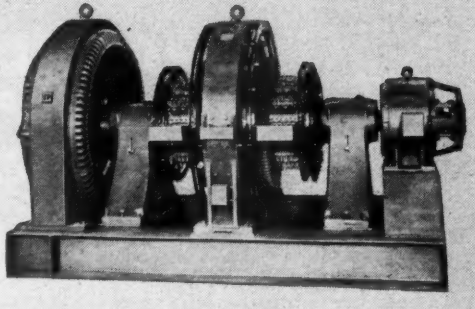
why EP motor-generators are best . . . for every application

Every electrolytic process is a special generating problem. Ordinary commercial machines cannot meet the established requirements of dependability and long life demanded by electrolytic service.

Because of the low voltages of electrolytic processes, resistance losses, for example, must be minimized. Small voltage drops, permissible in conventional generators, must be avoided. All current-carrying parts of Electric Products generators are designed for minimum voltage loss.

The Electric Products Company has, for 35 years, *specialized* in electrolytic generator design. Whatever the application, Electric Products Company will design a motor-generator especially to fit your requirements.

WRITE FOR BULLETIN 202. It describes the entire line of E. P. Motor-Generators for the Electrolytic Processes.



Every part of an E.P. Motor-Generator is readily reached for inspection and maintenance particularly important with relation to the bottom brushes. E.P. equipment requires no special protective equipment. Thirty-four years of operating experience prove that these Motor-Generators function safely under the extreme conditions common to most electrolytic operations.

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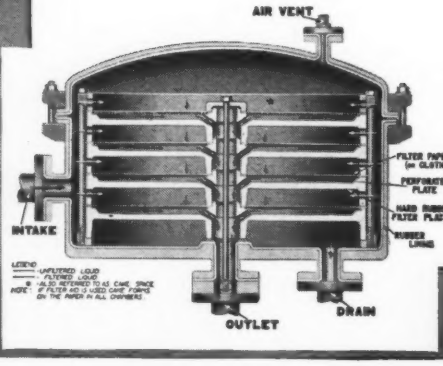

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Personals

to Advertising Manager of Reynolds Foil Division with headquarters in Richmond, Va. In his new position, Mr. Christensen will concentrate on the advertising and sales promotion for the Aluminum Division.

William Price, who has been superintendent of plating for a number of concerns in the Toronto, Canada district, has started up in business for himself manufacturing specialty plating racks.

Kinzel

Dr. A. B. Kinzel was recently elected President of Union Carbide and Carbon Research Laboratories, Inc. Graduated from Columbia University, A.B., in 1919, Massachusetts Institute of Technology in General Engineering, 1931, and the University of Nancy, France, D. Met. Ing., 1922, where he also received the degree D.Sc., Dr. Kinzel is Director of the American Welding Society, Director of the American Institute of Mining and Metallurgical Engineers, and Chairman of the Engineering Foundation Board as well as Chief Consultant in metallurgy to the Los Alamos Laboratories and the Argonne National Laboratories of the Atomic Energy Commission. During the war, in addition to his work for the Manhattan District, Dr. Kinzel was Senior Consultant on Metals for the War Production Board, Chief Consultant on metals to the Enemy Branch of the Foreign Economic Administration, Project Supervisor of the War Metallurgy Committee, and served on the Technical Industrial Intelligence Commission in England, France, and Germany as head of the Metals Section. He has been associated with various metallurgical Units of Union Carbide and Carbon Corporation since 1926.

Dr. H. J. Creighton, Head of the Department of Chemistry at Swarthmore College, received an honorary LL.D. degree from his alma mater, Dalhousie University, Halifax, Nova Scotia on March 9. Dr. Creighton, who earned his D.Sc. degree in Zurich, Switzerland in 1911, is well known for his many contributions to electrochemistry and as author of "Principles and Applications of Elec-

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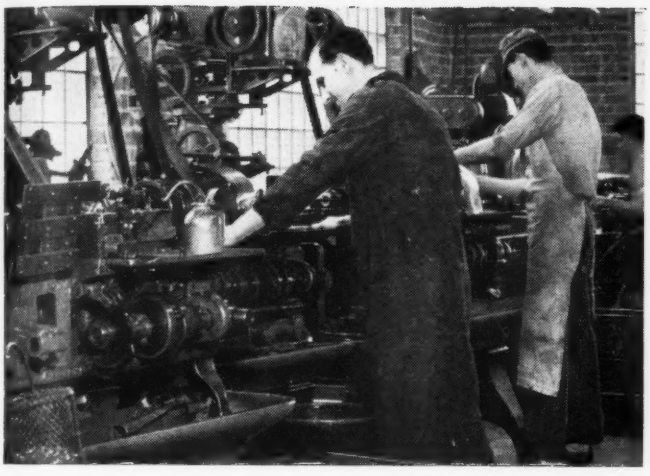

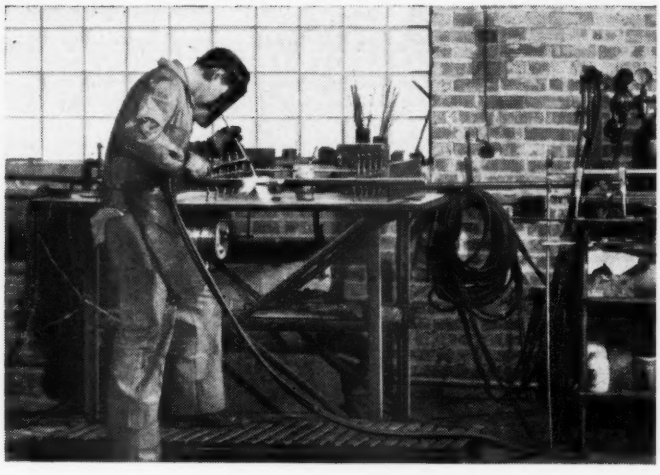

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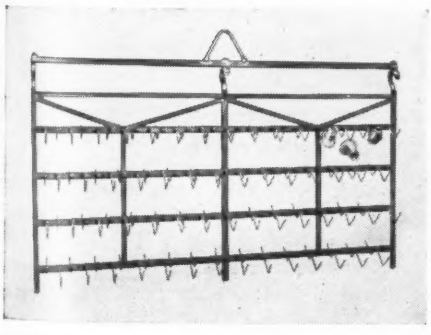

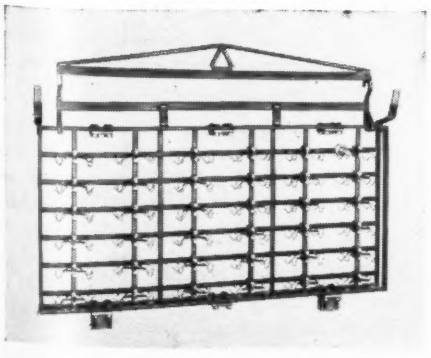

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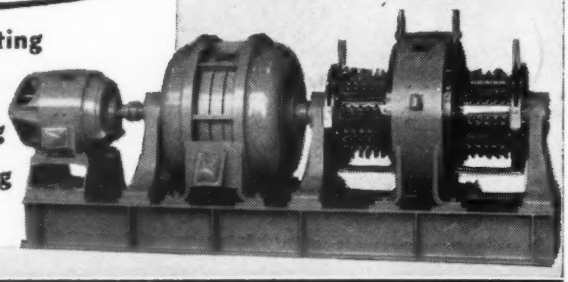

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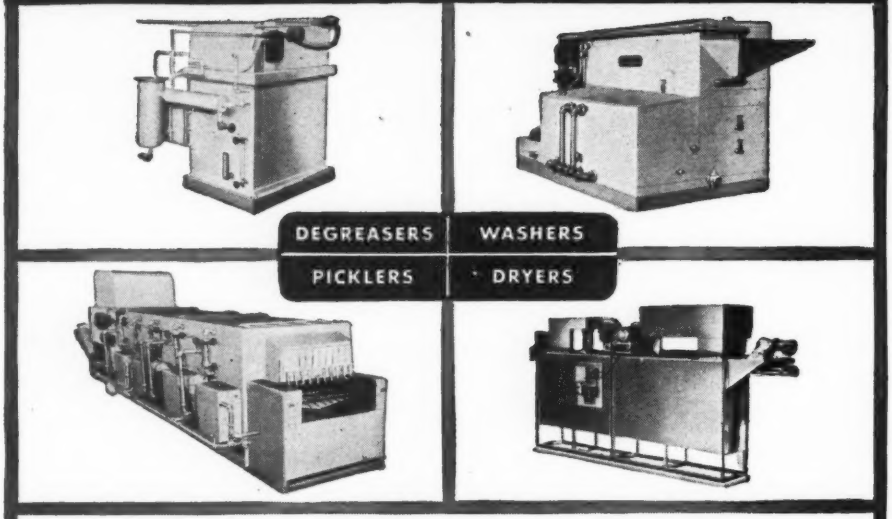

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Personals

trochemistry", Volume I. He received the 1946 Award of the Edward Goodrich Acheson Medal and Prize from the Electrochemical Society, of which he was the president in 1939.

I. William Marcovitch recently joined the United States Gauge Company, Sellersville, Pa., as Chief Chemist. He will have control of the plating, polishing, and painting departments.

Galen S. Woodruff has been appointed Sales Engineer in the Cleveland office of The Udylite Corporation, according to an announcement by L. V. Nagle, Vice-President and Sales Manager.

Mr. Woodruff comes to Udylite from Lincoln Industries, where he was a foreman-plater. He has a broad industrial background, and, in 1945–1946, served in the U. S. Navy.

Arthur Severs and **Lloyd Williams**, who were formerly salesman and chemist respectively of Canadian Hanson & Van Winkle Company, Toronto, Canada, have joined forces in a plating supply business of their own.

Dr. John A. Hutcheson has been appointed director of the Westinghouse Research Laboratories, succeeding Dr. L. Warrington Chubb.

Dr. Chubb, who is retiring from active direction of the Laboratories for reasons of health, has been named director emeritus and will continue to serve in an advisory capacity. The veteran scientist recently rounded out 40 years of research and engineering with Westinghouse, the last 17 as head of the Laboratories.

Born in Park River, North Dakota in 1905, Dr. Hutcheson was graduated from the University of North Dakota in 1926 and joined Westinghouse soon thereafter as a graduate student electrical engineer. Later, as a design engineer, he specialized on communications equipment.

In 1940 Dr. Hutcheson was named manager of the electronics engineering department at the company's Baltimore plant. During the war he supervised the engineering of all the radio communication and radar equipment produced by Westinghouse for the armed forces. He was appointed associate director of the Laboratories in 1943, in which capacity he formulated plans for atomic energy development. He will remain active in both fields.

When development of atomic energy shifted to peacetime applications, Dr. Hutcheson became chief advisor to a group formed to coordinate and advance all atomic energy research within Westinghouse.

He holds an honorary doctor's degree awarded him in 1943 by the University of North Dakota in recognition of his achievements in radio and electronics engineering.

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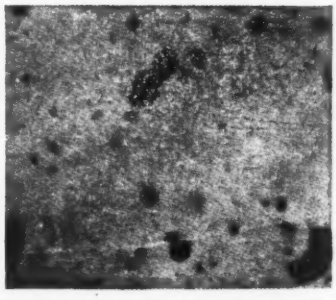
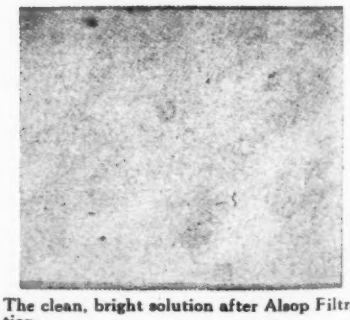


The dirt, dust and sludge present before filtration.



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Editorial

APRIL 1948

CHANNELS OF COMMUNICATION

ONE OF THE serious criticisms of the Army's handling of the atomic bomb project during the war was its insistence on compartmentalization whereby a scientific group concerned with a certain field of inquiry was kept away from other groups dealing with other phases of the project. Many scientists felt that they could have done their jobs better and more efficiently if they had known what the other scientists were doing.

When the War Production Board was organized, its chairman, Donald Nelson, arranged that his men would deal directly with their counterparts in the Armed Services instead of having to go through the usual "channels" up and down the lines of authority. This direct channeling of information did much to shorten the war.

The present rapid development of techniques in the plating industry requires that channels of communication between the men in the industry be kept open and direct. He who is isolated, through lack of foresight on his own part or that of his employer, will soon lose much of his potential value. The successful man is the one who knows what is happening and what is going to happen in his industry and who can plan for tomorrow's requirements while he does today's work.

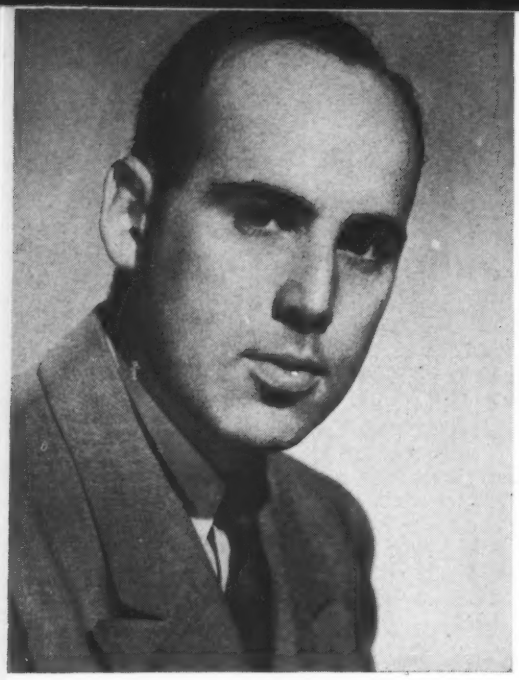
There are a number of channels for comminication of technical information, such as journals, books, and interviews with salesmen. But most direct are the technical societies. Aside from their publishing activities they have a very special function—bringing together people who have complementary experiences and who speak the same language. On a small scale, this takes place in the local branches or chapters, on a larger scale at national or international conferences.

The United States and Canada are singularly fortunate in that not less than three major technical societies pay particular attention to the plating industry. The Electrochemical Society, through its Electrodeposition Division which meets at least once each year, lays emphasis on the more theoretical aspects of electroplating which are of particular interest to the research worker. Committee B-8 on Electrodeposited Coatings of the American Society for Testing Materials is interested in promoting the use of quality coatings on plated parts and in preparing specifications, test methods, and recommended practices to further this end; it meets twice a year and its working sections more frequently.

In the American Electroplaters' Society are brought together people of varied interests: the scientists, the engineer, the supply-house representative, and above all the production man. Its program centers around that typically American concept of "know-how" which is the basis of efficient production and the lack of which stimulates new developments. Its local Branch meetings, its Annual Conventions, and the Industrial Finishing Expositions which it sponsors furnish an unequalled opportunity, formal and informal, for exchange of ideas which may be adapted to individual needs.

Technical societies are cooperative undertakings. He who wants much must give much. Channels of communication must be open both ways.

Gustaf Soderberg



E. E. McSWEENEY *Battelle Memorial Institute, Columbus, Ohio*

Dr. E. E. McSweeney is well acquainted with organic coatings for metals, having supervision of much of Battelle's research in this field. In addition, he is active in the work of several technical groups, having served on the Committee on Rosin and Rosin Products of A. S. T. M., as president of the Cincinnati-Dayton-Indianapolis-Columbus Paint and Varnish Production Club, and as secretary-treasurer of the Paint, Varnish, and Plastics Division of A. C. S.

Dr. McSweeney graduated from Oberlin College in 1934 with a B.A. degree in chemistry and received his doctorate from the University of Rochester in 1938. He has been associated with Battelle ever since. He has been the author and co-author of several technical papers on organic coatings and other plastics, including contributions to the Plastics Catalog and Modern Plastics Encyclopedia.

ORGANIC COATINGS FOR METALS

COATINGS ARE generally applied to metals to protect them from deterioration and to maintain or improve their appearance. There are also many special applications for coatings, such as prevention of fouling, reduction of glare, etc., but these are outside the scope of this article. The present discussion will deal primarily with the composition in relation to performance.

Organic coatings usually comprise at least two types of materials, vehicle and solvent, and many contain a third, pigment. Until about twenty-five years ago, the number of materials in each of these three classes which were available to the coatings formulator was limited. Now, the basically different materials number in the hundreds, and the significantly different variations within any specific class of material (alkyd resins, for example) bring the number of materials used by the coating manufacturer well into the thousands. From this it can readily be seen that the number of individual coatings which might be made is infinite.

Several factors should be considered in selecting a coating for any specific application. Foremost is the need for coating and type of service expected. Such factors as interior or exterior exposure, flexibility, hardness, and resistance to water, alkali or other chemicals must be considered. Cost is always of paramount importance and is often not studied too seriously. Cost per gallon is usually carefully considered but is very often misleading while the more significant cost per finished article is all too often overlooked entirely.

Mechanisms of Film Formation

Many methods have been used to classify organic coatings, but none is entirely satisfactory because in any classification one type of coating blends gradually into another without any clear line of demarcation. One of the most satisfactory systems is based on the mechanism of film formation, which may be defined as the process by which the coating in bulk form (usually liquid) is transformed into the relatively thin, more or less hard and tough, adherent film on the metal. There are four general methods of film formation: (1) solidification, (2) solvent evaporation, (3) oxidation, and (4) polymerization. The determining factor in film formation is, of course, the vehicle; the solvent also plays a role, but the pigment is relatively unimportant. The following discussion will, therefore, be limited to unpigmented coatings.

(1) *Film Formation by Solidification*

Many coatings may be applied without solvent in a melted state, either by dipping or flame spraying. The film is then formed simply by solidification of the resin. The simplest coating materials, such as the waxes, come under this classification. Although they may also be applied from solution, many waxes are used as hot melts since they become very fluid on heating. The utility of wax coatings is quite limited because they do not form very tenacious or durable films. However, they do find use as temporary coat-

ings. By adding a higher molecular weight resin, such as ethyl cellulose, to waxes, tougher films are obtained as typified by the hot-melt, strippable coatings developed a few years ago.

In this category also are the polyethylene and Thiokol (polysulfide synthetic rubber) coatings which are flame sprayed to give very tough and highly resistant films suitable for such items as tanks.

(2) *Film Formation by Solvent Evaporation*

For convenience in application, many resins are dissolved in a suitable solvent; after application, the film forms rapidly by solvent evaporation. The rate of drying is governed by the volatility of the solvent and by the "solvent-release" characteristics of the resin. Because no chemical change is involved, very rapid drying can be achieved. However, the last few per cent of solvent usually evaporates very slowly so that force-drying at temperatures up to 180° F or higher is often used to develop maximum hardness quickly. Because of the rapid solvent evaporation, it is difficult to formulate brushing-type lacquers, although this can be done by using high-boiling solvents and sacrificing drying speed to some extent.

In this class are included the lacquers based on long-known natural resins like shellac and copal as well as newer resins like the vinyl copolymers and styrene copolymers. Probably the best-known materials in this class are the nitrocellulose lacquers which were developed just after the first World War and which, by 1925, permitted finishing of automobiles on fast production schedules. Nitrocellulose by itself gives a hard, brittle, and poorly adherent film. It is, therefore, almost always used with plasticizers such as castor oil, alkyd resins, etc. More recently other cellulose derivatives, such as cellulose acetate and acetate-butyrate and ethyl cellulose, have been developed as coatings.

Also in this class are the so-called vinyls, which are usually vinyl chloride-acetate copolymers (Vinylite) or vinyl chloride-vinylidene chloride copolymers (Saran, Geon). These materials are noted for their excellent chemical resistance and, for that reason, have been widely used as stop-off coatings. However, they have one serious defect in that they develop adequate adhesion only on baking at high temperatures (300–350° F), although there is now one vinyl resin which gives fair adhesion to clean metal on air drying. By blending other resins with vinyl copolymers, lacquers can be formulated which have quite good adhesion; some of the acrylic resins, similar in composition to "Plexiglas" and "Lucite", are of particular interest in this regard.

These "acrylics" also are *per se* very useful coating-resins and are of special interest where good heat resistance is mandatory. Although thermoplastic, they will withstand quite high temperatures (up to 500° F) without discoloration and have been recommended for such uses as stove enamels.

Just as the nitrocellulose lacquers grew out of the first World War, so the styrene copolymer resins are growing out of the recent war. The very considerable plant capacity developed for the production of GR-S, which comprises about 25 per cent styrene and 75 per cent butadiene, can also be used to make polymers in which the ratio is reversed and may go as high as 90 styrene:10 butadiene. These are hard resins as compared to the rubbery GR-S. In spite of the extravgant claims made for them, they seem to be reasonably useful materials and are finding a place in the coatings industry.

All lacquers have the same inherent disadvantage of low solids content and most contain relatively expensive solvents. Because ordinary lacquers will range from 15 to 25 per cent solids, relatively thin films are obtained per coat and large amounts of valuable solvent are lost unless elaborate solvent recovery systems are used. Three developments of recent years have been aimed at overcoming these defects. One was the development of high-solids (up to 40 per cent) lacquers which are sprayed hot. The second was the development of gel lacquers, which are solid gels at room temperature but become quite fluid at temperatures of about 120° F. Very thick films (about 10–15 mils) may be applied by dipping, and the coating dries hard enough to handle on cooling to room temperature. Time for complete evaporation of solvent is, therefore, relatively unimportant. The most recent development is that of the paste resins. These are high molecular weight resins which are dispersed (not dissolved) in solvent (organosols) or in plasticizers (plastisols). Since the solids content is quite high (about 60 per cent for organosols and 100 per cent for plastisols), thick films can be applied. These coatings must be fused at 300–350° F to form the films. Adhesion to metals is usually very poor unless special primers are used.

(3) *Film Forming by Oxidation*

Many coating materials are liquids or soft, sticky solids which form films by a complex, not too well understood oxidation-condensation process. Linseed oil and ordinary oleoresinous varnishes are typical of the group. These materials initially absorb oxygen from the air and then undergo a complex condensation reaction as a result of which the vehicle hardens and a film is formed.

Many paints are still used in which the sole vehicle is an oil such as linseed. These vehicles are seldom applied unpigmented since they give very soft films. Where faster drying, better hardness, and better water resistance are desired, varnishes are used in place of the oil. Varnishes are made by "cooking" an oil and resin together at an elevated temperature (up to 600° F) and then thinning with a solvent. The ratio of oil to resin ranges from 1:1 or less for uses where exterior durability is not required but water resistance and hardness are important to 4:1 or 5:1 in so-called

spar varnishes. Until a few years ago natural resins (rosin, copal, etc.) and linseed oil were about the only raw materials available to the varnish maker. Now there are many synthetic varnish resins and several oils such as tung oil, which is a very superior varnish oil, and special varnish oils derived from linseed, soya bean, and dehydrated castor oils. Another very important coating material, the alkyd resins, belong in the broad varnish classification. These resins are really varnishes, the resin component of which is made and reacted with oils or oil acids simultaneously. Alkyds are now probably the most widely used coating materials and as a class represent the largest of all our synthetic resin production. They are the basis of modern rapidly drying industrial and architectural enamels and are noted for their excellent color retention, which accounts for their wide use in refrigerator coatings, etc.

It should be emphasized that although the coatings considered in this group all dry by oxidation at room temperatures, they may also be baked at elevated temperatures. No great change in film properties is noted up to about 160° F, but above this temperature (the exact temperature varies and may be as high as 400° F for some coatings) a change in the mechanism of film formation occurs and condensation and polymerization reactions become predominant although some oxidation is still essential.

Almost without exception baking gives films with better hardness, flexibility, chemical resistance, and durability than does air-drying; in fact, even acquers which undergo no chemical change on heating give more dense, adherent films when baked.

(4) *Film Formation by Polymerization*

There are a number of coating materials which do not set or harden by prolonged exposure to air but which do set very rapidly on heating. These are the so-called heat-convertible resins, such as the phenolics, ureas, and silicones. They are applied as compounds of fairly low molecular weight which, upon heating, react with themselves to form much larger molecules so that a thermo-set or essentially infusible film is formed.

Among the earliest members of this class were the phenolic-resin baking finishes which are quite similar to phenolic molding resins. They give hard, somewhat brittle films which are quite resistant chemically (except to alkalis) and fairly heat resistant so that they may be used for coating the interior of boilers and hot water pipes.

About 1937, the organic finishing industry was given another very versatile group of resins in the ureas and melamines. These are somewhat similar to the phenolics but have much better color and are suited to use in the best white enamels. Because they are quite brittle by themselves, they are usually employed with alkyd resins to produce finishes for refrigerators, washers, automobiles, and many other uses.

Also in this class are most of the silicones, the main advantage of which is that they have much better heat resistance than any other resin. However, they are still very expensive (about $3.00 per pound).

Plasticizers

Many good film-forming materials are inherently brittle and require plasticization to make them suitable as coating materials. The best illustration of this type is cellulose nitrate, which by itself gives hard, brittle, nonadherent films. A wide range of plasticizers is used, varying from relatively simple "pure" chemicals, such as dibutyl phthalate, to natural and processed oils (castor oil, etc., for cellulose nitrate) and synthetic resins, such as alkyds for nitrocellulose, urea, and melamine resins, polyvinyl butyral for phenolic resins, and synthetic rubbers for phenolics and vinyl chloride resins. Although plasticizers are added primarily to increase flexibility, they have many other effects on the coating and final selection is often based on these secondary effects. They will often improve adhesion but may also decrease it. Permanence of film properties will depend on volatility or ease of extraction of the plasticizer; for example, nitrocellulose lacquers plasticized with dibutyl phthalate become very brittle on aging due to loss of the plasticizer. Chemical resistance may be greatly lessened by plasticizers; hardness is almost always decreased.

Solvents

A wide variety of solvent materials are used; their selection depends upon the vehicle and the method of application. For spraying applications, fairly volatile or "fast" solvents are employed to obtain quick drying, while for brushing much less volatile, or "long," solvents, usually in the 300–400° F boiling range, are used to allow proper flow.

Dip coatings require very special solvent formulation to obtain good flow without sagging, streaking, or excessive tear formation. Consideration must also be given to loss of solvent from the dip tank which would cause an increase in viscosity. For this application, a judicious blend of "long" and "short" solvents is usually indicated.

Selection of solvents according to chemical types will depend on the vehicle used. For simple oil paints or varnishes, hydrocarbon solvents such as petroleum naphthas or aromatics will be used. The latter are slightly more expensive and stronger solvents and are required for some varnishes, including many alkyds, which have limited solubility in aliphatic hydrocarbons. Small amounts, 1 to 5 per cent, of polar solvents, e. g., butanol, which are not good solvents for varnish vehicles, are often used because they cause a marked decrease in viscosity and a reduction in gelling tendency. Larger quantities may cause gelation or "kick-out" of the resin.

Cellulose acetate and nitrate lacquers and vinyl resins require much stronger and more expensive

oxygenated solvents, such as esters (butyl acetate, amyl acetate, etc.) and ketones (methyl ethyl ketone, methyl isobutyl ketone, isophorone, cyclohexanone, etc.). Although these resins are soluble only in such solvents, their solutions may often be diluted with cheaper hydrocarbon solvents. Therefore, the thinners for many lacquers are mixtures of strong solvents and hydrocarbons and may not be solvents, *per se*, for the resin. If solvent has evaporated from the original solution, addition of diluent may therefore cause precipitation of the resin.

Pigments

Thus far, pigments have been mentioned only casually, although the majority of all coatings used are pigmented. In addition to being decorative, pigments serve many functional purposes. Foremost of these is probably corrosion resistance, for which such old stand-bys as red lead are still very effective and widely used although many new pigments have been introduced recently. Of the latter, zinc chromate is the best known and has been employed extensively in primers for aluminum and magnesium. Blue lead, zinc dust, and lead powder have also been used in corrosion-inhibitive paints.

Other functional uses of pigments include improvement of hardness and durability, control of chalking, prevention of mildew, etc.

There are many decorative pigments, ranging from carbon black, titanium dioxide, and iron oxide to organic dye colors, such as most of the reds.

In addition to "hiding" pigments, extenders such as barytes, whiting, silica, mica, and magnesium silicate are commonly used to reduce cost, since it is obviously uneconomical to use more of a pigment such as titanium oxide than is needed to obtain the desired hiding. Extenders often have a functional use, too, and contribute to durability, water resistance, etc.

Primers

Primers are used basically to secure good adhesion to metal but may also be relied upon for corrosion resistance, in which case inhibitive pigments will be employed. Levelling and gloss of top coats is also affected by primer formulation.

For most metals, e. g., ferrous alloys, copper, aluminum, and magnesium, ordinary oleoresinous or alkyd varnishes are quite satisfactory. Lacquers, in general, have rather poor adhesion and should be avoided in primers if possible, although some have fairly good adhesion, especially to very clean metal. In this connection, a new primer based on polyvinyl butyral (the resin now used in most safety glass) is achieving some popularity because of its excellent adhesion; when applied in very thin coats (0.1–0.5 mil), it affords an excellent primer for many metals and for many types of top coats. Zinc is notorious for lack of adhesion; oleoresinous vehicles containing zinc dust and zinc oxide are, however, fairly satisfactory.

"Lifting" of primers by top coats, i. e., wrinkling loosening, or blistering of primer film by solvent in the top coat, must be guarded against and limits the selection of primer. This is especially true when lacquer top coats are used that contain strong solvents. This difficulty is readily avoided by using baking primers which have been sufficiently thermo-set to be only slightly soluble in solvents.

Factors to Be Considered in the Use of Coatings

Having considered the composition of coatings, we will now give attention to some factors pertaining to their use.

Surface Preparation

Careful preparation of the metal to be coated is mandatory for best results. Rust and other corrosion products should be removed by pickling, sandblasting, flame cleaning, or wire brushing; oil films and loose dirt by vapor degreasing, with a solvent dip or wipe, or in an alkali dip or spray. Further pretreatment, such as phosphate or chromate coating, anodizing, or metal coating with lead, tin, cadmium, or zinc may also be required where maximum performance is desired.

A word of caution in regard to use of chlorinated solvents is in order. Although they are very efficient cleaners, there is some evidence that they leave the metal more susceptible to corrosion, especially if precautions have not been taken to prevent hydrolysis and resultant acid formation.

Application

There are various means of applying organic coatings, such as brushing, roller coating, dipping, slushing, and spraying. The last four can be completely mechanized, if desired. Recent developments are electrostatic spraying wherein the paint spray is charged by passing through an electrostatic field and is then attracted to the oppositely charged metal to form a uniform film with a minimum of overspray. A similar process is electrostatic detearing wherein the heavy edge of the coating from dipping or slushing is removed by passing the coated article through an electrostatic field.

Film Thickness

Film thickness and number of coats will depend on the type of material and service required. For some applications such as can coatings, very thin films of about ¼ mil are sufficient. For most applications, however, film thickness of 1–3 mils are common. For automotive finishes, for example, about 1½ mils of primer and an equal amount of top coat are usual.

It is extremely difficult to prepare thin films (under 1 mil) which are free from microscopic pinholes. Two, or preferably, three, thin coats are therefore preferred to one thick coat since the possibility of superimposed pinholes in multiple coats is very slight.

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Frank C. Mesle

FRANK C. MESLE has risen from the ranks to become one of the outstanding platers in the country. Born in Buffalo, N. Y., on March 18, 1884, he spent his boyhood and early manhood in Niagara Falls, N. Y. His formal schooling was very limited; he went to work for Oneida, Ltd., at the tender age of thirteen and has remained with that company ever since, moving with it to Sherrill, N. Y., near Oneida, in 1914.

Starting as an errand boy, he soon moved to the plating department, where he advanced from scrub boy to foreman, then became plating consultant and industrial engineer. During World II, he organized the Bearing Plating Department and became its superintendent, a position which he still holds.

The plater of those early days had to learn the business the hard way. What plating formulas were in existence were carefully locked up by the foreman plater, who considered them his stock in trade. Mesle confesses to forcing the lock and taking the formulas home to copy. He also had to be plumber and electrician; in short, a man of all work.

With his intense desire for more knowledge, Mesle helped to organize the first Buffalo Branch of the American Electroplaters' Society and served as its first secretary. Not only has he attended every A. E. S. Convention except in 1932, but contributed a number of excellent papers, mostly on silver plating. Of broad interest is his chord method for measuring thickness of electroplated coatings and his "can opener" test for measuring bond strength. For these and other contributions he has received the Society's Founder's Gold Medal not less than four times, in 1929, 1938, 1940 and 1943. He served as editor of "The Monthly Review", the predecessor of "Plating", from 1923 to 1925, and as A. E. S. President in 1926. He was a member of the Society's Research Committee at its inception and still is.

Mesle has not limited his interests to technical activities. He is also an ordained minister in the Reorganized Church of Jesus Christ of Latter Day Saints. For eight years he served a small congregation in Niagara Falls and is still active in the same capacity in Sherrill. He is a member of Sherrill Lodge A. F. and A. M. and of the local O. E. S., of which he is also a Patron and a District Grand Lecturer.

For relaxation Mesle has enjoyed golf, but considering it an old man's game he gave it up a few years ago for tennis. When his boys start to beat him he plans to return to golf. During the Winter months he bowls, and his team heads the list in its League.

A married man for thirty-five years he has three children, two red-headed boys and one girl who wishes she had red hair. There were four grandchildren at the time these data were assembled and had fifth underway.

Mesle is a man of many accomplishments and living a well rounded life. Can anyone wish for more.

Streamlined Analytical Control of Gold-Alloy Plating Solutions

KARL NELL

Hickok Manufacturing Company, Rochester, N. Y.

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SINCE THE EARLY DAYS of gold alloy plating it has been known that the composition of the plating solution is one of the main factors that determine the character of the plate. Thus regular analysis of the solutions has been considered essential, especially be, cause gold and the alloying metals do not plate out in the ratio that exists in the plating solution. Gold, being a very noble metal, plates out much faster than-for example, nickel or copper, and if one does not watch out, the solution will soon become depleted in gold. In many places, therefore, the gold solutions have been used to the point of exhaustion and then discarded. In other places, additions of gold and metal solutions have been made regularly, which sometimes works very well, sometimes doesn't. To base such additions on chemical analysis of the plating solutions has not always been possible, because the usual methods of analysis are rather involved, cumbersome and slow.

In these times of mass production when parts are plated in separate operations to be assembled at a later stage and yet must match in color to make the finished product saleable, inspection methods are very strict. For this reason the gold alloy plating solutions must be kept fairly constant in composition by analytical control at rather frequent intervals, and the lack of a simple method of analysis of the main constituents has been noticeably felt.

The gold in gold plating solutions is usually determined volumetrically by an iodimetric method with arsenite or thiosulfate solution as the titrant; some laboratories prefer gravimetric methods. Nickel is almost universally determined by methods which make use of dimethylglyoxime. For the copper determination a number of methods are used such as the volumetric iodine-thiosulfate method, the electrolytic method, polarigraphic methods, and the colorimetric ammonium hydroxide method. Cyanide is usually determined by titration with silver nitrate. Phosphate, a seemingly minor but important factor in gold plating, is not determined at all in many places.

The difficulty with this approach is that so many and very different methods have to be applied in order to get one solution analyzed. As a consequence, when the analytical results become available, they show little resemblance to the actual composition of the plating solution if it has been used in the meantime. Few plants can afford to shut down plating tanks while waiting for the analysis.

The author has endeavored to cut materially the time required for this analysis. The main idea was to develop a method that would make it possible to start with one small sample only and determine as many constituents as possible step by step. After extensive experimentation he has found a succession of colorimetric methods for gold, nickel, copper, and phosphate which is applicable to one relatively small sample of 5 or 10 cc of plating solution.

Cupric ion, as is well known, gives a dark blue complex with an excess of ammonia. Since the blue is deeper the more copper is present, the copper-ammonia complex lends itself nicely to colorimetric determinations and has long been made use of. The corresponding nickel-ammonia complex has been shown not to interfere.

The nickel content is determined by the widely used bromine-dimethylglyoxime method.

An innovation is the colorimetric analysis of gold with o-tolidine, which gives a distinct yellowish color with auric chloride. Since o-tolidine forms a similar yellowish compound with free chlorine, excess chlorine, which has to be added to the gold sample in order to transform the aurous salt into auric, must be driven off completely by boiling the sample slowly to dryness before the colorimetric determination of the gold can be successfully undertaken.

Another novelty in the plating laboratory seems to be the determination of phosphate with 1-amino-2-naphthol-4-sulfonic acid. The procedure is planned so that the phosphate determination comes to the analyst almost as a by-product of the other determinations with comparatively little extra effort.

The gravimetric or volumetric methods hitherto used for the gold determination required a relatively large sample, which was entirely consumed by the analysis. This is not the case with the method suggested here; only a very small sample is taken, and of that only a very small portion is used in the final test. After the gold has been converted from the aurous cyanide to the auric chloride (just as for the volumetric analysis) and a small portion has been taken for the gold analysis, the "left overs" are used for the determination of copper and nickel, the two metals mostly encountered in gold alloy plating. In the traditional procedure copper and nickel are converted to sulfates and nitrates by treatment with sulfuric and nitric acids; this extra treatment is omitted here because the chlorides prepared in connection with the gold determination serve just as well in the methods for these metals. The result is a considerable saving in time.

After the excess chlorine has been completely boiled off (by the way, the most "touchy" step in the procedure), there is no further time-consuming heating, cooling or neutralization—the sample is ready for four determinations. The carefully planned outline of procedure will shorten the time for analysis further, hence makes it possible for the plating room foreman to receive the desired information much earlier than heretofore. Another advantage of the method is the very small sample used at a considerable saving of valuable plating solution and reagents in the course of a year.

The greatest advantage of the methods is also their greatest disadvantage: since they are extremely sensitive, the glassware (beakers, burettes, pipettes, test tubes, flasks, etc.) must be spotlessly clean in terms of 0.01 milligram.

Because the transmittance of light is measured in colorimetric analysis, the sample in the electrophotometer must be free from all turbidity; if it is not, filter it through dry filter paper into a dry cell (do not wash it down with water!); if it contains gas bubbles (as in the nickel determination), let it stand a few minutes in the cell, then tap the cell lightly to make the bubbles rise; also see to it that the cell is dry on the outside and that there are no fingermarks or other spots on it.

In the copper analysis a part of the sample is split off from the rest and diluted differently. The reason is that the copper test is less sensitive than the tests for gold, nickel, or phosphate; in the same concentration as the copper, the colors in these tests would be extremely deep, far beyond the range of the meter. It is, therefore, necessary to adjust the concentration of the solutions to the sensitivity of the reagents.

The determination of free cyanide and carbonate has to be carried out in the usual way. The methods are included here for sake of completeness.

Since the color of the plate must be the same at all times, the solution and especially its gold content must be kept as uniform as possible. Hence it would be poor practice to wait to make additions until the analytical results become available. We, therefore, found it advisable to analyze gold plating solutions (without any additions in-between) before and after a certain number of pieces (100 or 500) had been plated to see what changes had taken place. We then made up an addition solution and put it in handy 100-ml bottles and arranged that the foremen or tank operators add the contents of one such bottle to a tank after the specified number of pieces have gone through it. In that manner the solution composition is kept within very close limits: the analytical results vary only little, and very small extra additions bring the bath up to standard. Instead of making an extra addition, we may, on the basis of the analysis, change the composition of the addition solution or the number of pieces to be plated between each addition. A slight deviation from the norm can even be made up for by the operator changing the applied amperage, since an increase in current density will result in a deposit richer in the alloy-metal (nickel or copper) and *vice versa*.

Colorimetric Procedures

A. *Preparation of sample:*

1. Pipette exactly 10 ml of the plating solution into a clean, dry 250-ml beaker.

2. Under a fume hood (steps 2 to 5) add 10 ml conc. hydrochloric acid, and bring to a boil.

3. Add 2 ml conc. nitric acid, boil slowly for about 5 minutes without drying.

4. Remove from the heat, add 10 ml 5 per cent sodium hypochlorite solution (prepared by diluting one part of commercial hypochlorite which contains 3.5 per cent available chlorine with two parts of distilled water) and 20 ml distilled water.

5. Simmer the contents on a moderately hot plate (or over a low flame) for ten minutes or more to drive off completely excess chlorine (any traces of free chlorine will interfere with the gold determination). It is advisable to let the solution evaporate slowly, to stop heating just when it starts drying on the beaker, and to leave the beaker on the plate until the contents are completely dry. Fanning the fumes over the beaker with one's hand and taking a cautious sniff will also show when the pungent chlorine odor has disappeared.

6. Add about 50 ml distilled water, and swirl the beaker slightly to take up the residue.

7. When fairly cool, transfer all the contents of the beaker into a clean, dry 100-ml volumetric flask by rinsing with a washbottle all residues on the sides and bottom of the beaker carefully into the flask.

8. Fill the flask to the mark with distilled water, and mix.

9. Pipette exactly 50 ml into a 250-ml volumetric flask, leaving exactly 50 ml in the 100-ml flask.

10. Fill the 250-ml flask to the mark with distilled water, and mix.

If the copper determination is not required, use half the amount of solution and reagents specified in steps A-1 to A-4, and in step A-7 transfer the solution in the beaker directly into a 250-ml volumetric flask, rinsing the sides and bottom of the beaker with a washbottle into the flask, fill the latter to the mark with distilled water, and mix.

If silver is present in the gold alloy solution, for example in a "Pink Gold" bath, larger amounts of hydrochloric acid, 30 instead of 10 ml, and of nitric acid, 6 instead of 2 ml, are added in steps A-2 and A-3, respectively. The silver chloride must be allowed to settle following step A-8 before the 50-ml sample is taken in step A-9. The silver content of the bath is determined in the conventional way.

B. *Determination of copper:*

1. From a 10-ml burette add dropwise conc. ammonium hydroxide to the 50 ml remaining in the 100-ml volumetric flask until the acid has been neutralized. Appearance of a bluish precipitate which redissolves after a couple of drops of ammonium hydroxide have been added in excess signalizes the endpoint. The solution will, at the same time, turn bluish. Do not add any more ammonium hydroxide from the burette, but

2. Add a measured amount, 20 ml, of conc. ammonium hydroxide to the flask, and swirl.

3. Fill the flask to the mark with distilled water, and mix.

4. Fill the absorption cell of the colorimeter, spectrophotometer, or electrophotometer with solution prepared in step B-3.

5. With distilled water in the reference cell and a red filter (650 millimicrons), read the optical density of the blue solution. (The optical density is the logarithm of the inverse value of the light transmittancy of a solution: D = log 1/T; on the Fisher electrophotometer it is the reading on the "A" scale.) Mark down the reading.

6. A graph, previously prepared with a standard solution containing a known amount of copper, will give in g/l, oz/gal, or ml/gal the concentration that corresponds to the meter reading.

C. *Determination of nickel:*

1. From the contents of the 250-ml volumetric flask prepared in step A-10 pipette exactly 10 ml into another 100-ml volumetric flask, and add about 40 ml distilled water.

2. Add 5 ml of a 20 per cent potassium-sodium tartrate solution (prepared by dissolving 20 grams of the salt in 100 ml distilled water) and swirl for a short time.

3. Add under a fume hood 5 ml of saturated bromine water, and swirl. (The bromine water is prepared under a hood by breaking a 1-ounce capsule of bromine into a beaker with 700 ml distilled water.

4. Add 5 ml of conc. ammonium hydroxide and swirl.

5. With a pipette add 4 ml of a 1 per cent dimethylglyoxime solution (prepared by dissolving 1 g dimethyglyoxime in 100 ml methyl alcohol), and swirl.

6. Add another 5 ml of bromine water, and swirl.

7. After 1 minute, add 10 ml of 24 per cent sodium hydroxide solution (prepared by dissolving 24 g CP sodium hydroxide in 100 ml distilled water and cooling), and swirl for a few seconds.

8. Fill the flask to the mark with distilled water, mix well, and let stand open for about five minutes.

9. Fill an absorption cell of the electrophotometer, spectrophotometer, etc., with the solution from step C-8, and let stand for another five minutes; tap cell slightly with fingertips to cause gas bubbles to rise.

10. With a blue filter (425 millimicrons) or a green filter (525 millimicrons) and with distilled water in the reference cell, read the optical density (scale "A" on the Fisher electrophotometer), and mark down the reading.

11. Find the nickel content in g/l, oz/gal, or ml/gal in a previously plotted graph prepared with the same filter that is used in the determination. It may be good practice to plot graphs with each of the two filters mentioned and to use the blue filter and corresponding graph for low nickel concentrations and the green filter and corresponding graph for high concentrations.

D. *Determination of gold:*

1. From the contents of the 250-ml volumetric flask prepared in step A-10 pipette exactly 10 ml into a clean, dry 100-ml volumetric flask.

2. Add about 80 ml distilled water.

3. Add exactly 5 ml 0.1 per cent o-tolidine reagent (prepared by dissolving 0.100 g o-tolidine in 100 ml 1.0 N hydrochloric acid. A 1.0 N HCl solution is prepared by diluting 83 cc of content-rated C. P. hydrochloric acid to exactly 1 l with distilled water in a 1 l volumetric flask).

4. Fill to mark with distilled water, mix and let stand for ten minutes. (Chlorine also gives a yellow compound with o-tolidine and must have been driven off completely in step A-5.)

5. Fill the absorption cell of the electrophotometer, etc., with the solution prepared in step D-4.

6. No sooner than ten minutes and no later than twenty minutes after step D-3 read the optical density of the solution, using distilled water in the reference cell and either a purple filter (440 millimicrons) or a blue filter (425 millimicrons). (On the Fisher electrophotometer the density is read on the "A" scale.) Mark down the reading.

7. In the graph (previously prepared with a solution of known gold content) find the concentration in g/l, troy oz/gal, or ml ready-made gold solution per gal plating solution, using the curve corresponding to the filter used. The same filter must be employed in both plotting the graph and the determination. It is advisable to plot two curves, one with the purple and one with the blue filter, and use the former for solutions of low gold concentration and the latter for solutions with high gold concentration.

E. *Determination of dibasic sodium phosphate:*

1. From the solution in the 250-ml volumetric flask prepared in step A-10 pipette 5 ml into a clean 100-ml volumetric flask.

2. Add about 80 ml distilled water.

3. Add with a pipette exactly 5 ml of molybdic acid reagent, and shake. (To prepare this reagent dissolve 6.250 g ammonium molybdate, $(NH_4)_6Mo_7O_{24}.4H_2O$, in about 125 ml distilled water in a 250-ml beaker, add carefully 35 ml conc. sulfuric acid, and, when fairly cool, transfer this mixture without loss into a 250-ml volumetric flask, then add distilled water to the mark, and mix well.)

4. Add with a pipette exactly 2 ml 1–amino-2-naphthol-4-sulfonic acid reagent. (To prepare this reagent dissolve 10 g cryst. sodium sulfite, $Na_2SO_3.7H_2O$, in 19 ml distilled water or 5 g anhydrous salt, Na_2SO_3, in 24 ml distilled water (solution *a*); dissolve 30 g sodium bisulfite, $NaHSO_3$, in 200 ml distilled water and filter if necessary (solution *b*); dissolve 0.500 g 1-amino-2-naphthol-4-sulfonic acid in 5 ml of solution *a*, add 150 ml of solution *b;* if precipitation occurs, add 5 to 10 ml more of solution *a*, then dilute to 200 ml with solution *b;* keep the reagent in a well stoppered brown bottle; prepare a fresh one every two weeks.)

5. Fill the flask to the mark with distilled water, shake, and let stand for ten minutes.

6. Fill the absorption cell of an electrophotometer, etc., with the solution prepared in step E-5 and the reference cell with distilled water, and not sooner than ten minutes and not later than twenty minutes after step E-4, read the optical density (scale "A" on the Fisher electrophotometer) with a red filter (650 millimicrons) or with a purple filter (440 millimicrons). Mark down the reading.

7. Find in a graph, previously prepared with a standard phosphate solution, the amount of phosphate in g/l or oz/gal. The same filter must be used in both the plotting of the graph and the determination. It may be a good practice to make curves with each of the two filters and use the red filter for solutions of low phosphate concentration and the purple one for those of high concentration.

NOTE: Filling of volumetric flasks to the mark is best done as follows: Add enough distilled water from the hose from the storage bottle, with a beaker, or through the mouthpiece of the washbottle to reach the bottom of the neck of the flask and stop there. Add the last few milliliters that go into the neck of the bottle from a washbottle with a rubber bulb on the mouthpiece so arranged that the flow of water can be stopped instantaneously at any point. All volumetric glassware (flasks, burettes, pipettes) is calibrated so that the meniscus (the lower part of the downwardly curved top-line of the solution) must be even with the mark. Pipettes are best filled with the help of a pipette filler (a small pump easily attached to the top of the pipette, held in place with one hand, and operated with the index finger of the same hand); it is neither advisable, nor practical to suck up the liquid with the mouth.

PREPARATION OF GRAPHS

There are principally two ways of preparing the required graphs, both equally satisfactory provided they are properly done.

One is to make up a standard solution with a CP chemical containing the particular ion to be determined, for example, a copper sulfate solution, one ml of which will contain exactly 1 mg copper. Various amounts of this standard solution are then treated exactly as outlined in the foregoing procedures and the optical density read with the proper filter; the readings are then plotted on graph paper and the points connected with a line. The points should fall in a straight line for all the solutions dealt with here. If as many as 6 points out of 8 can be connected with

a straight line, the two off-the-line readings can be disregarded. They might have been caused by improperly cleaned glassware, incomplete boiling off of chlorine, loss of valuable drops during transfers, or accidental contamination. In some cases one may find that the line gradually drops on one end or the other or both. This fact serves as a warning that any graph should be used only in the zone of actual standardization and must not be extended beyond this range.

All colorimetric reagents require a certain dilution of the ion being tested in order to give reliable readings and straight curves. If the concentration of the ion is below the range of the sensitivity of the reagent, there is either no color change at all or one that is so faint that the readings are not reproducible; on the other hand, if the concentration is too high, the color becomes so deep that even a very sensitive meter cannot register the optical density of the solution. (Similarly, an analytical balance which registers the weight very reliably between grams and milligrams cannot be used to weigh micrograms or pounds.) The concentrations of the solutions and the methods must be adjusted to the sensitivity of both the reagent and the instrument.

The ammonium hydroxide method for copper gives very good results when the final sample put into the absorption cell has a copper content of 3 to 30 milligrams per 100 milliliters. The other three reagents are by far more sensitive and hence require a further dilution of the sample: with the bromine-dimethylglyoxime method the final sample should contain 0.05 to 0.5 milligram nickel per 100 milliliters; with the o-tolidine method 0.05 to 0.4 milligram gold per 100 milliliters; with the 1-amino-2-naphthol-4-sulfonic acid method 0.1 to 2.0 milligrams phosphate ion per 100 milliliter.

The standard solutions may be prepared as follows:

Copper standard: Dissolve exactly 3.93 g CP copper sulfate, $CuSO_4.5H_2O$, in distilled water, and dilute to exactly 1 liter in a volumetric flask. (1 ml contains 1 mg copper.)

Nickel standard: Dissolve 0.0674 g nickel ammonium sulfate, $NiSO_4.(NH_4)_2SO_4.6H_2O$, in distilled water, and dilute to exactly 1 liter in a volumetric flask. (1 ml contains 0.01 mg nickel.)

Gold standard: Weigh exactly 0.010 g 24 Kt gold foil or wire and, under a fume hood, place it in 20 ml aqua regia (15 ml conc. hydrochloric acid and 5 ml conc. nitric acid); when it has completely dissolved, take the beaker off the flame, add 10 ml 5 per cent sodium hypochlorite solution (NaOCl) and 20 ml distilled water, let simmer for at least 10 minutes until the contents are just beginning to dry on inside of the beaker and the excess chlorine has been completely driven off (fan with the hand over the beaker and sniff cautiously; the very pungent odor of chlorine gas should have gone). Take up the residue with 100 ml distilled water, transfer the contents of the beaker volumetrically to a 1-liter volumetric flask and dilute to exactly 1 liter. (1 ml contains 0.01 mg gold.)

Phosphate standard: Dissolve exactly 0.1495 g anhydrous disodium phosphate, Na_2HPO_4, in 700 ml distilled water and 100 ml 1.0 N sulfuric acid, transfer volumetrically to a 1-liter volumetric flask, and fill to the mark with distilled water. (The 1.0 N H_2SO_4 is prepared by diluting 28 ml concentrated CP sulfuric acid to exactly 1 liter with distilled water. Add the acid first to about 300 ml of water, cool, transfer to a volumetric flask, and fill to the mark.) (1 ml phosphate standard contains 0.1 mg phosphate.)

Another way to prepare the graphs would be to make up 250 cc standard solution that is very similar to the actual plating solution, but contains even amounts so that the calculations are reduced to a minimum. For instance, if the plant solution is a so-called 18 Kt gold alloy solution made up from proprietary gold and nickel cyanide solutions, the standard solution may be prepared from 100 ml of the same gold-cyanide solution, 100 cc of the nickel-cyanide solution, 2 oz sodium cyanide, and 2 oz disodium phosphate per gallon. Standard solution of 250 ml is prepared by dissolving 6.6 ml gold solution, 6.6 ml nickel solution, 3.75 g sodium cyanide, and 3.75 g disodium phosphate in a small amount of distilled water, transferring volumetrically into a 250-ml volumetric flask, and filling to the mark with distilled water. Into 100-ml volumetric flasks are put 1, 2, 5, 10, 15, 20 and 25 ml of the standard solution and each sample is treated as indicated in procedures A to E. The readings are plotted on graph paper as before. With an original sample of 5 ml (no determination of copper) and a 10 ml sample from the 250-ml flask (step A-10) for the nickel determination, 10 ml for gold, and 5 ml for phosphate, the corresponding readings may be assigned the values of the standard solution: 100-ml nickel solution, 100 ml gold solution, and 2 oz disodium phosphate per gallon, respectively. Hence, for example, the 5-ml nickel reading represents 50 ml nickel solution per gallon; the 20 ml nickel reading, 200 ml nickel solution per gallon, etc. Those values are marked in the graph.

If the gold alloy solution is one which contains copper, such as the 14 Kt gold, the pink gold, and the Hamilton gold solutions, the standard solution will also have to contain copper solution. Because a much larger sample is needed for the ammonium hydroxide determination of copper than for the other determinations, the size of the original sample is normally doubled to 10 ml (A-1); other sizes may be preferred if the copper content differs materially, in which case the amounts of reagents used in A-2 to A-4 should be adjusted accordingly.

Fig. 1 shows a graph plotted from the readings obtained with a number of samples from various standard plating solutions containing 100 ml/gal of a proprietary 14 Kt gold solution containing copper, or

100 ml/gal of a proprietary hard gold solution containing nickel, or 100 ml/gal of a proprietary 24 Kt gold solution. Each of these standard solutions also contained 1.67 oz/gal sodium cyanide and 1.67 oz/gal

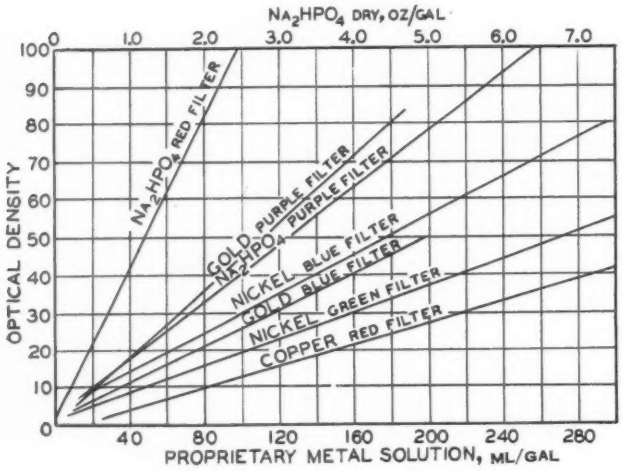


Fig. 1. Typical graph for colorimetric analysis of gold alloy solutions prepared from proprietary standard solutions and dry disodium phosphate

disodium phosphate. The 250-ml standards were prepared with 6.6 ml of each of the liquids and 3.11 g of each of the solid salts.

The curves for the three metals in Fig. 1 were plotted from the readings obtained with the aforesaid standard plating solutions. The two curves for the disodium phosphate were derived from readings obtained with the straight phosphate standard containing exactly 0.1 mg phosphate ion per ml. If the answer is wanted in terms of crystalline disodium phosphate, the figures have to be multiplied by 1.89.

It should be noted that this graph is only an illustration and cannot be used for any other set-up than that by which and for which it was made. Each laboratory has to prepare its own graphs with its own standards, instruments, reagents, filters, glassware, etc., because all these and many others have an effect on the readings; even the personnel is a factor. The preparation of standards, the running of standard samples, and the making of the graphs is a sizable undertaking, but once that has been done and done well, the analytical work becomes relatively easy and the amount of calculation has been reduced almost to zero.

Free Sodium Cyanide and Sodium Carbonate

F. *Determination of Free Sodium Cyanide:*

1. Pipette a 5-ml sample into a 250-ml erlenmeyer flask.

2. Add 100 ml distilled water.

3. Add 1 ml 10 per cent potassium iodide solution made up by dissolving 10 g KI in 100 ml distilled water.

4. Titrate with a 0.1 N silver nitrate solution while gently swirling the flask until the first faint permanent turbidity of the solution; this is the end point. (The 0.1 N $AgNO_3$ is prepared by weighing exactly 17.00 g of CP silver nitrate crystals, dissolving them in about 400 ml distilled water, and diluting in volumetric flask to exactly 1 liter. This standard solution must be kept in a dark brown bottle.)

5. Mark down the burette reading at the end point.

6. Multiply the volume of silver nitrate solution used by 0.262 to get the free sodium cyanide content in oz/gal.

G. *Determination of Sodium Carbonate:*

1. Pipette 5 ml of plating solution into a 250-ml beaker.

2. Add 100 ml distilled water and warm.

3. Add 10 per cent barium nitrate solution while stirring until no more precipitate forms, and allow to settle. (The 10 per cent $Ba(NO_3)_2$ solution is prepared by dissolving 10 g of the CP salt in 100 ml warm distilled water and letting it stand warm to complete solution.)

4. Filter the solution through filter paper. Add a few drops of the $Ba(NO_3)_2$ solution to the first portion of the filtrate to make certain that no more precipitate can form; if any does form, return everything to the original beaker and repeat step 3 to completion, then filter again.

5. Wash all contents of the beaker into the filter paper with hot water, then wash the filter paper with hot water.

6. Transfer the filter paper containing the precipitate back into the original 250-ml beaker.

7. Add 50 ml distilled water and a few drops of 0.2 per cent methyl orange indicator solution.

8. Titrate with 1.0 N hydrochloric acid solution until the first permanent pink color appears. (The 1.0 HCl standard is prepared by diluting 83 ml CP conc. hydrochloric acid to exactly 1 liter in a volumetric flask.)

9. Mark down the number of milliliters used and multiply this figure by 1.412 to get the carbonate concentration in oz/gal.

Acknowledgment

The following sources were freely consulted during the development of the control method described here: E. B. Sandell, "Colorimetric Determination of Traces of Metals"; Snell and Snell, "Colorimetric Methods of Analysis"; Fisher Scientific Company, "Colorimetric Analysis with the AC Model Fisher Electrophotometer"; and Technic, Inc., "Instruction Sheets for Gold Analysis." I wish to thank our chief chemist, Mr. James Weaver, and his assistant, Mrs. Anne Chandler, for their patient cooperation and helpful suggestions.

STRIPPING OF ELECTRODEPOSITS

NORMAN D. HOFFMAN

United Platers, Inc., Detroit, Mich.

ANY DISCUSSION of stripping of electrodeposits must include consideration of several interdependent factors, including the reason for and purpose of the operation, the nature of the base metal, and the available stripping methods.

Stripping may be undertaken as a result of faulty plating which may manifest itself in one or more ways. Among them are:

1. Blistering or pitting of the plate
2. Roughness, burning, or staining of the plate
3. Die draw lines or polish lines in the base metal showing through the deposit
4. Over- or undersize of the deposit or the plated part
5. Application of the wrong kind of plate
6. Stoppage during deposition resulting in lamination of the coating

The purpose of such stripping is, of course, salvage of the part. But stripping may also be used for other reasons, and it is important that the plater know the precise purpose of the operation. A few of these purposes are:

1. Dimensional change by partial stripping
2. Removal of stop-off deposits after carburizing or nitriding
3. Thickness testing in which the size of the part is measured before and after stripping
4. Electropolishing

One may also include in stripping the dissolving of the base metal which is used in the preparation of electrodeposited masking shells, and the like.

The choice of stripping solution depends not only on the nature of the coating to be removed but also on several other factors. Foremost among them is the nature of the base metal. While the following difficulties are nearly always present, the improper combination of base metal and strip will magnify the hazards of:

1. Pitting of the article
2. Dissolving of the base metal causing undesirable dimensional changes or opening of base metal pores
3. Hydrogen embrittlement of the part
4. Excessive passivation of the underlying metal making subsequent replating difficult

Other factors which influence the choice of stripping solution are:

1. Nature of deposit or deposits between the outer plate and the base metal
2. Shape of the part being stripped, which affects current distribution in electrolytic stripping
3. The purpose of the stripping operation, which determines the permissible tolerance to the several hazards enumerated above
4. The kind of racks available, deterioration of racks resulting in expensive losses not only of the racks themselves but also of the parts, which may burn or fall to the bottom of the container for the strip

Stripping Processes

Commonly used stripping processes fall into one of two classifications: the immersion type and the electrolytic type. Of these, the former type is often cheaper and easier to install, but the latter type is usually faster. The two types will be considered separately.

Immersion Type

(a) *Chromic-sulfuric acid* strips at room temperature are used to remove copper from steel and cadmium from steel, especially spring steel. A common composition is

Chromic acid	1 lb/gal
Sulfuric acid	5 ml/gal

It is advisable to bake spring steel after stripping to reduce the possibility of hydrogen embrittlement. Thorough alkaline cleaning in a separate tank must be used to remove all traces of chromate remaining after rinsing to prevent blistering and peeling of subsequent plate.

(b) *Full-strength muriatic acid* removes zinc or cadmium from unbuffed steel and chromium from brass, copper or nickel. It is not recommended because it causes severe enlargement of the pores in the base metal which may result in roughness or abnormal porosity on replating.

(c) *Inhibited muriatic acid* is used to remove cadmium or tin from steel, brass, or copper, also zinc and cadmium from cast iron. A typical composition is:

Muriatic acid	1 gal
Antimony oxide	2 oz
Water	½ pt

The stripping is carried out at room temperature.

Black smut of metallic antimony forms over the surface, which tends to inhibit the action of the muriatic acid on the steel. However, in spite of this the strip tends to cause hydrogen embrittlement of sensitive base metals. The smut may be removed in a reverse cleaner.

(d) *Ammonium nitrate* solution containing 1 lb/gal is used at room temperature to remove cadmium from steel. It is an ideal strip for both shop and laboratory use. It is necessary to have authorization to stock and use the ammonium compound because it is rated as an explosive.

(e) *Alternate soaking in sulfide and sodium cyanide* solutions is used to remove copper from iron and steel and some non-ferrous metals. Parts are immersed in a solution of liver of sulfur, "Liquid Sulfur", or other sulfides for three to five minutes during which time an appreciable portion of the copper deposit becomes converted to copper sulfide. After rinsing, the part is soaked in a hot concentrated solution of sodium cyanide until the copper sulfide has dissolved. After rinsing, the cycle is repeated until all copper has been removed. See THE MONTHLY REVIEW **34**, 958–962 (1946).

(f) *Fuming nitric acid* serves to remove nickel with or without an intermediate copper coating from steel. Great care must be taken not to drag in water which causes a reduction in the oxidizing properties and an increase in the acid properties of the acid and hence result in pitting or solution of the base metal. The parts should therefore always be dried before immersion in this bath. Sometimes etching is encountered during rinsing after stripping; this may be overcome by dipping in chromic acid solution before rinsing in water.

(g) *Nitric acid, 50 per cent by volume*, at room temperature strips most electrodeposited metals from aluminum.

(h) *Nitric acid, 20 per cent by volume*, is used at 150° F to remove forming lead from steel or stainless steel springs.

(i) *Acetic acid-hydrogen peroxide* solution kept at room temperature is employed in the stripping of lead from steel. A suitable bath contains:

Acetic acid.....10% by volume
Hydrogen peroxide.....20%–10% by volume

Avoid large additions of peroxide which will cause vigorous "boiling". When the rate of stripping becomes low, add more peroxide.

(j) *Sulfuric-nitric acid* is commonly used to remove silver from brass, nickel-silver or copper. A suitable formula is:

Sulfuric acid.....19 vol
Nitric acid.....1 vol

This solution is operated about 180° F. Water must be kept out to prevent etching of the base metal. (See also (f) above.)

(k) *Sodium cyanide-hydrogen peroxide* solution acts as a strip for the removal of gold from copper, brass, steel, nickel or nickel alloy surfaces. A typical mixture calls for:

Sodium cyanide 2 oz
Water.....1 pt
Hydrogen peroxide .....as required

Although this bath is used at room temperature, it is liable to froth and "boil" vigorously if too much peroxide is added or too much heat is evolved. The strip should preferably be tried in a beaker before proceeding with a large installation.

(l) *Caustic soda* solution containing 1 lb/gal when used at its boiling point removes most paints from metal surfaces. If the paint is difficult to remove, the addition of a small amount of wetting agent or the application of reverse current should be tried; if 6 volt is not sufficient, use 12 volt. Note that zinc, aluminum and magnesium are soluble in this solution and should be stripped with a suitable thinner or proprietary stripping solution.

(m) *Alternate soaking in chromic-sulfuric acid and sodium cyanide-caustic soda* solutions* is used to remove silver from lead and some lead alloys. The silver is first converted to silver chromate in a bath containing:

Chromic acid..... 2 lb/gal
Sulfuric acid.....0.32 oz/gal

kept in a lead lined tank and operated at 130° F. After a one-minute immersion in this bath, the part is rinsed in cold water and then immersed in a bath containing:

Sodium cyanide.....3 oz/gal
Caustic soda.....3 oz/gal

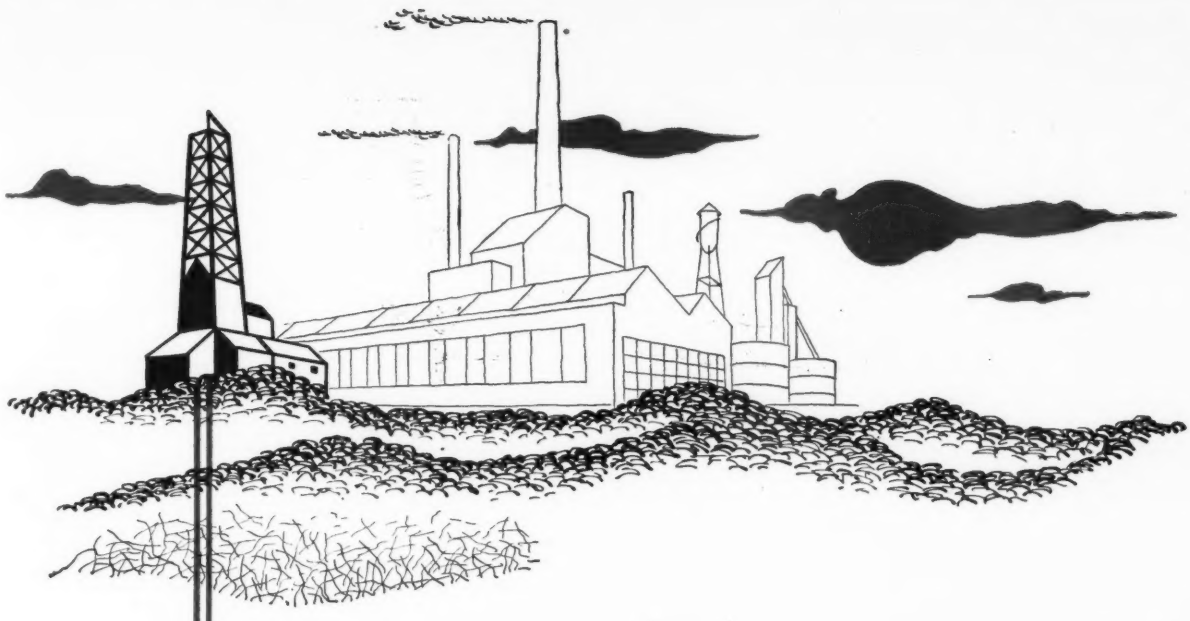
(*Continued on page 404*)

GENERAL RULES

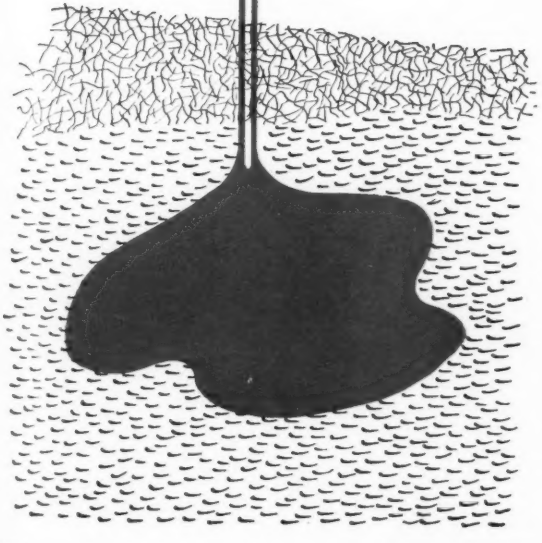
Besides selecting the proper strip solution for the particular job in question, one should observe the following general rules for all stripping operations:

1. Agitate the work to prevent pitting
2. Remove the work from the strip as soon as the deposit has been completely dissolved
3. Maintain as careful control of the strip solution as of a plating bath
4. In case of multiple deposits, do not remove more deposits than are necessary for satisfactory replating
5. Avoid stripping whenever possible and thereby eliminate the detrimental effects produced on the base metal during a stripping process
6. Always remember that it is more difficult to plate a stripped piece than it is to plate the original piece

*Contributed by Dr. R. B. Saltonstall, The Udylite Corporation, Detroit, Mich.



How a "salt cellar" helps cut your metal cleaning costs



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BEFORE AND AFTER

A Silver Recovery Plant

THE TRANSFORMATION of a thirty-year-old dilapidated, crowded, ill-ventilated and dirty shop into a spacious, spic-and-span and pleasant place to work is the theme of this story from Oneida, Ltd., silverware manufacturers in Oneida, N. Y.

Processes involving the use of hot, concentrated acids and the treatment of tons of silver chloride precipitate tend to be unpleasant and sloppy. These necessary processes can also become inefficient.

When the company's technicians decided that the old strip house had more than served its purpose, they were given the green light to go ahead and discard the old equipment. Everything was junked except the Duriron strip kettles and the shell of the old building. Then new floors and new equipment were installed.

What was accomplished in making the old strip house an efficient, up-to-date building can best be seen in the series of photographs taken before and after the work was completed.

The transformation of the old building included more than just a change in appearance. The old wooden tanks were eliminated, and the mezzanine floor was enlarged to provide space for ample storage of acid. The introduction of new units such as the electric strip in Fig. 3 left a large area for racks and storage of goods.

In the processing line the greatest change was in the handling of chloride. Instead of lugging pail after pail of hydrochloric acid up a ladder and pouring it into the old tanks as in Fig. 4, the operator now merely opens a spigot and allows brine solution to flow into the precipitating tank (Fig. 8). Where previously several months' accumulation of chloride from the old tanks had to be shoveled into crocks and laboriously washed by decantation, the chloride slurry is mechanically agitated and collected in a plate filter (Fig. 7).

Perhaps most important is the increased efficiency which resulted from the conversion and which more than paid for the change within eighteen months' time. This is an excellent example of what the use of modern materials, methods and laboratory controls can do in bettering working conditions and raising efficiency of operation. In addition, the quality of the chloride was improved.

The U. S. Stoneware Company, Akron, Ohio, supplied the equipment and materials.

Fig. 1. Strip line with hot-acid kettles on mezzanine floor before remodeling

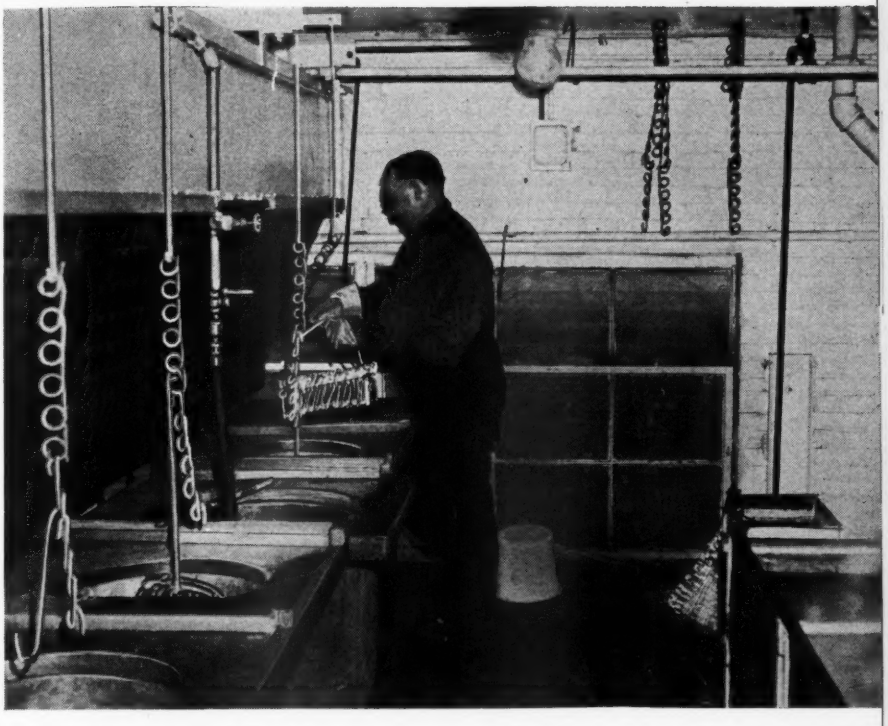

Fig. 2. Strip line after remodeling. Note Duralon coated steam jackets and ventilator screens

Fig. 3. New electrolytic strip line with crocks of Ceratherm chemical stoneware

Fig. 4. Carrying acid up the ladder for precipitation in old wooden tank

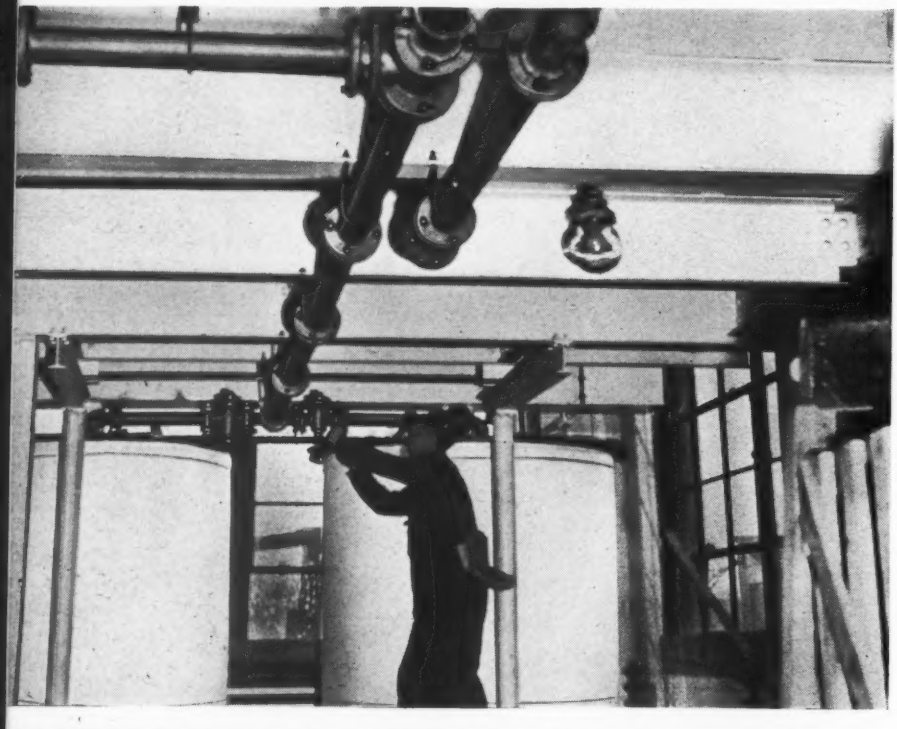

Fig. 5. Duriron piping from strip line and precipitation tanks

Fig. 6. Lower floor acid storage area before remodeling

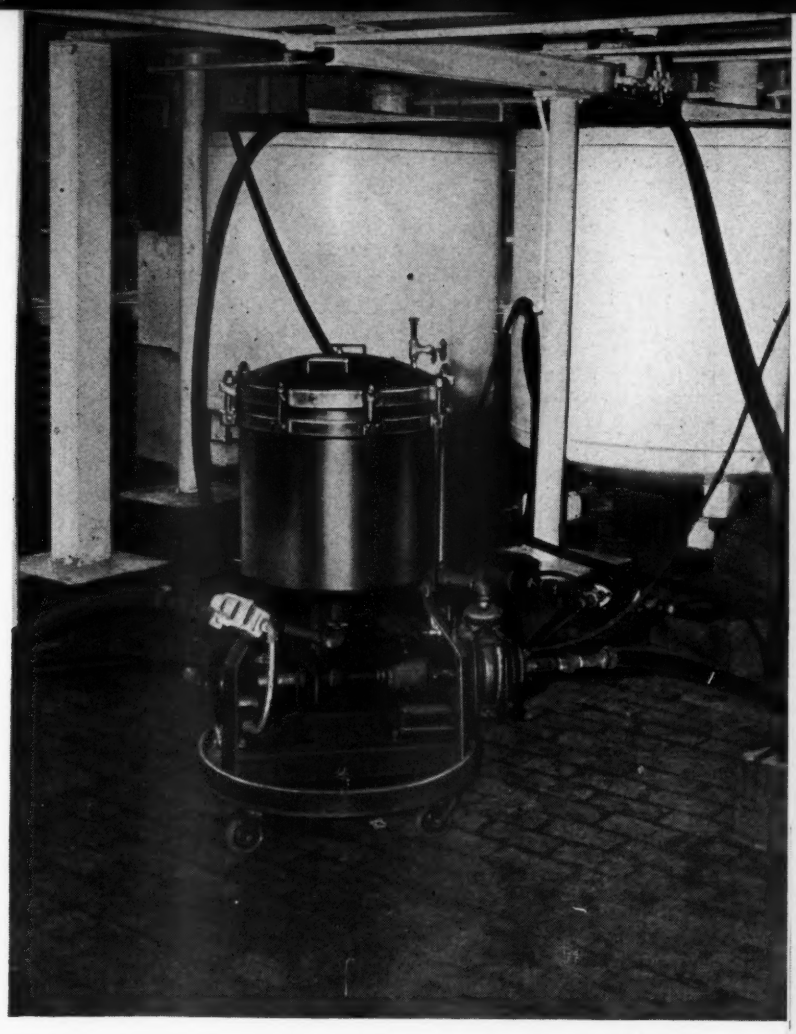

Fig. 7. Lower floor after remodeling with U. S. Stoneware acid proof brick flooring. Sparkler filter for collection of silver chloride with Nash glass pump in foreground; in the background precipitation tanks lined with Tygon on inside and painted with Tygon on outside

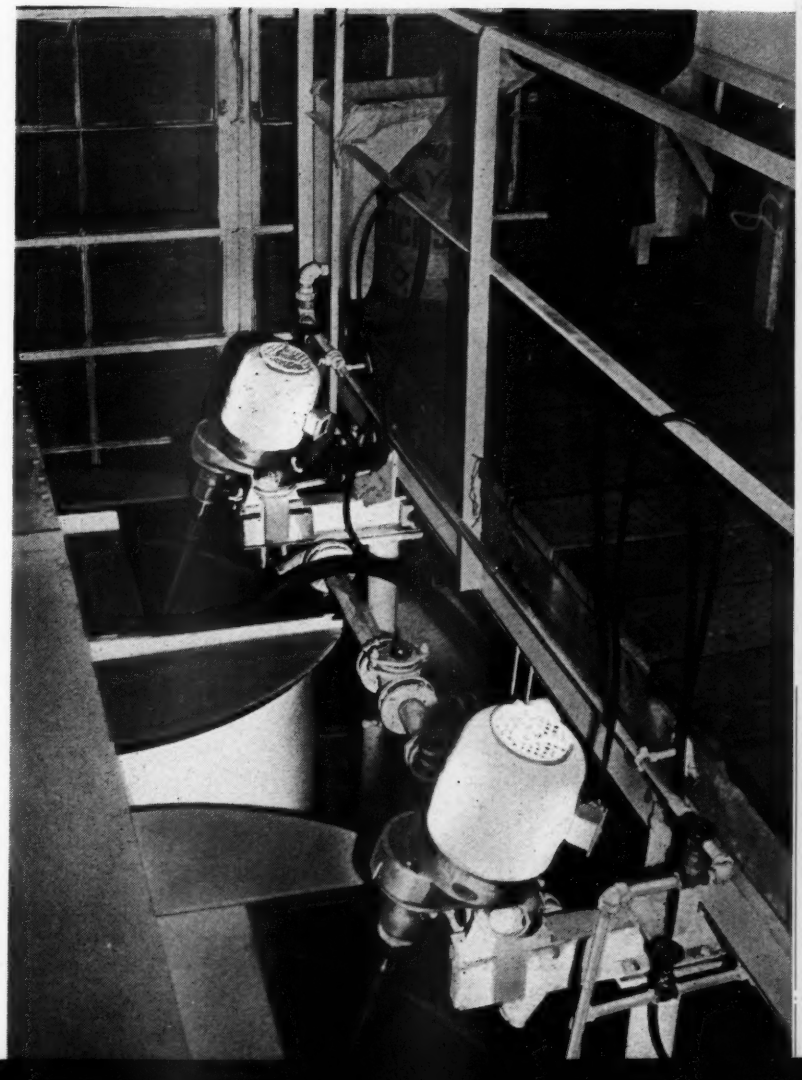

Fig. 8. View from mezzanine floor of precipitating tanks with Tygon protected ventilation ducts

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The Question Box

a department devoted to readers' questions of general interest

Q. 15. Why do soft spots and checks appear at times in hard chromium plate? May it be caused by too long a reversing period prior to plating?

A. All bright chromium plate has the same hardness. What seem to be "soft spots" are areas where the chromium plate is comparatively thin. Microscopic cracks or checks appear in most chromium plate. They are coarser and more numerous on areas of high current density. Assuming that the chromic acid to sulfate ratio is correct, the remedy for both defects is to arrange the anode surfaces so that the current density on the work is more nearly uniform. Too long a reversing period roughens the base metal but has no effect on the chromium itself.—J. M. Hosdowich.

A. The "soft spots" as a rule are in the base metal, which has been imperfectly hardened, and the reversing period prior to plating brings them out. Unless the chromium plate is of sufficient thickness to assume the true appearance of chromium, these spots will reproduce in the plate. The above-mentioned condition can be double checked by stripping the chromium anodically in an alkaline bath and noting the surface condition of the base, which should then have the soft spots. As for checks, they frequently occur on surfaces that became highly stressed on improper grinding. Wheel factors that influence this condition considerably are improper wheel speeds, too fast a cut, or an improperly dressed wheel taking a rough cut. If all these factors are under control, a stress relieving operation prior to plating will help considerably. The above discussion is presupposing that your chromium solution is up to standard.—Arthur W. Logozzo.

Q. 16. Please supply the method for removal of anodizing films from aluminum touched upon by Edward J. Kubis in Proc. Am. Electroplaters' Soc. **32**, *278 (1944).*

A. During the war we at the Briggs Manufacturing Company used a solution prepared from 0.167 lb chromic acid, 0.035 gal 75-per cent phosphoric acid and 0.08 oz wetting agent (Nacconol NR) per gal of solution. For control purposes the chromic acid (CrO_3) content was maintained at 20 g/l by running in an excess of ferrous sulfate, 15.00 ml 0.100-*N* solution for a 2-ml sample diluted to 50 ml, and back titrating with 0.100-*N* potassium permanganate to a purplish gray endpoint [g/l CrO_3 = 1.667 (15 ml $KMnO_4$)]. The phosphoric acid (H_3PO_4) content was kept at 48.5 g/l by titrating a 2-ml sample in 50 ml water with 0.100-*N* sodium hydroxide to purple endpoint in the presence of 3 drops of phenolphthalein indicator [g/l H_3PO_4 = 2.45 x ml NaOH − 1.63 (15 − ml $KMnO_4$ in CrO_3 titration)].—The solution is used hot (180°–200° F) in an ordinary steel tank (stainless steel may be better but we had no weld failures or other leaks during two years) with a steel steam coil, placed on the side of the tank to reduce caking. Our practice was to drain the tank every six months and remove the sludge; the solution may then be returned to the tank if desired—it seems very stable. Care must be taken that the work, including work rods, be completely insulated from the tank during treatment or the galvanic couple will cause the aluminum to turn black.—No appreciable aluminum is removed during the usual stripping time of 10 minutes; parts with close tolerances may be safely stripped and re-anodized, and racks with threaded clamps and thin aluminum sections will have much longer life with this solution than with others.—Edward J. Kubis.

Q. 17. The aluminum tubes which we use in the manufacture of tubular furniture are finished on a centreless grinder with stitched mops faced with 90 and 240 aluminum oxide. To produce the required finish the wheels are lubricated with stearic acid, which we find very difficult to remove by several minutes electrocleaning in 8 oz/gal sodium silicate solution at 12 volts, run cold for reason of cost, etching in cold 12 oz/gal caustic soda solution, and nitric acid dipping before sulfuric acid anodizing. Can you suggest a solvent which when used cold will remove the stearic acid and eliminate hand cleaning and which does not attack aluminum and its alloys?

A. Stearic acid is quickly saponified in hot alkaline cleaners. However, your silicate cleaner, if heated, would soon become contaminated with stearic acid and become difficult to rinse off; fatty acid films would also tend to redeposit in the acid dip. For room temperature removal of stearic acid I suggest trying trichlorethylene or ethylene dichloride. If it is possible to heat the solvent, I suggest a less costly hydrocarbon solvent such as a petroleum naphtha of a flash point above 160° F, used at 150° F which is above the melting point of stearic acid. You may also use a vapor or a vapor-solvent degreaser. It is cheaper to heat organic solvents than water solutions because specific heats of the former are considerably less.—W. R. Meyer.

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Book Review

by DR. HAROLD J. READ,
Associate Professor of Metallurgy
The Pennsylvania State College

AN INTRODUCTION TO METALLURGY by Joseph Newton, 2nd Ed., 1947, viii + 645 pages. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. Price, $5.50.

There are available very few books in the field of metallurgy in which the author attempts to cover both the physical and the chemical branches of the science. Of these, one of the most satisfying volumes is that of Prof. Newton, particularly in its second edition. Those who are familiar with the first edition will find that the book has been extensively revised, and that many of the minor errors which marred the original version have been corrected.

The author has attempted to touch at least to some extent on practically every aspect of metallurgy. This means, of course, that the treatment of some subjects must be quite superficial, and there are several places where it might have been better to have omitted a subject rather than give a treatment which is misleading by nature of its brevity. A case in point is the discussion of the mechanism of precipitation hardening. A simple but hopelessly inadequate explanation is given for this process, with no indication that it is not satisfactory in light of modern knowledge. One cannot help but feel that it would have been preferable to have dismissed the subject with a remark to the effect that a proper explanation was beyond the scope of the book.

The reader will not find this book by any means a sugar-coated pill which he can swallow at his convenience in an evening and wake up the next day a full-fledged metallurgist. The great mass of material will require diligent study and careful attention on the part of the reader if it is to be of any great value. Every page is packed with information which, with a minimum of explanatory detail, may make for tough going, but on the other hand, the value of having so much material of great variety in one book is obvious, particularly for those individuals who do not care to build up a many-volumed library in the field of metallurgy. An excellent index has been provided, making it possible to use the book for specific reference purposes without becoming familiar with the entire text.

In addition to the references for further reading which appear at the end of each chapter, a considerable number of exercises and problems are provided. The correct answers are frequently given for the latter, and will prove of value to the home student.

This book may not be perfect in every respect, but it can be highly recommended in comparison with others devoted to the same objective.

Abstracts

For copies of original articles, turn to your Public Library for photostats or addresses of the publications in question

Limestone Used to Neutralize Acid Wastes. A. L. Reidl. Chem. Eng. **54,** 100–101 (July 1947).
Describes unique system of upflow limestone beds and aeration used by General Electric's Philadelphia Works for neutralizing the effluent from acid dipping and plating operations. Need for expensive acid pumps is thus eliminated. Gives some experimental data regarding the proper size of the beds and the optimum rate of flow of the acid.

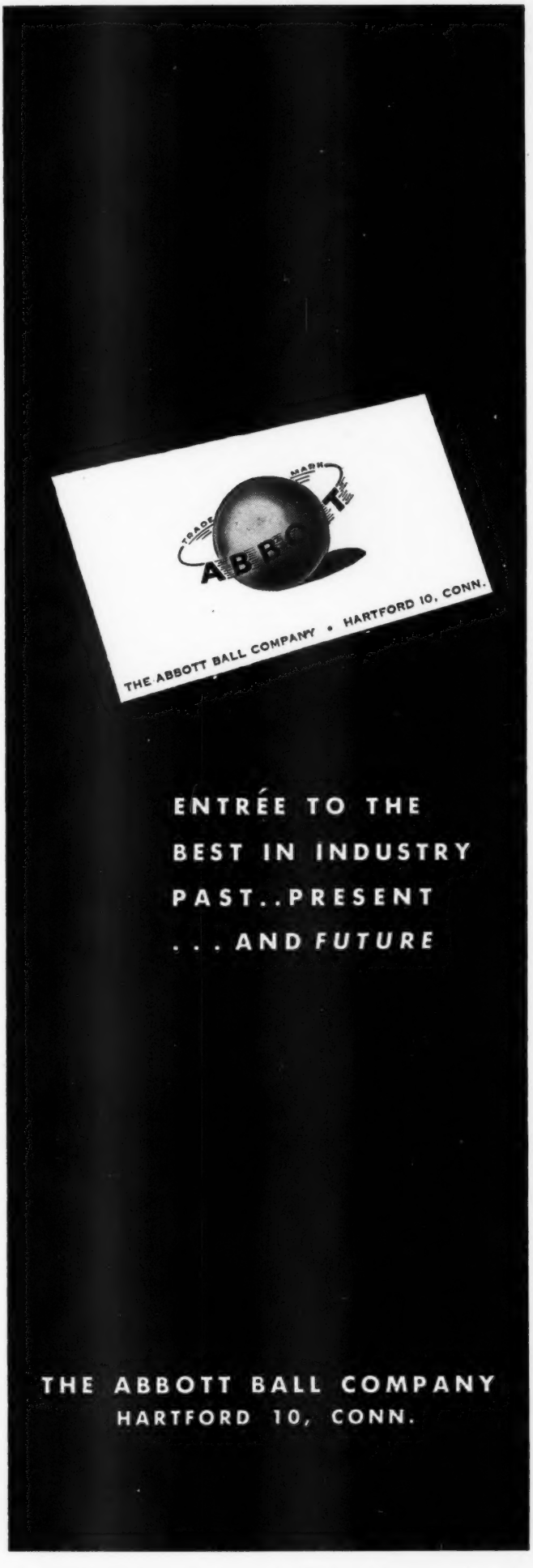
Rating Exposure Test Panels of Decorative Electrodeposited Cathodic Coatings. W. A. Wesley. Am. Soc. Testing Materials, Preprint **38** (1947), 12 pp.
Discusses rating methods and describes a set of numerical reference standards developed for use in recent cooperative tests.

Inspection of Exposure Test Panels with Non-Decorative Electrodeposited Cathodic Coatings. H. A. Pray. Am. Soc. Testing Materials, Preprint **39** (1947), 4 pp.
The function of cathodic electrodeposited metallic coatings used for purely protective purposes is discussed and the way in which they deteriorate on weathering is described. Rating systems are summarized, with particular emphasis on the methods used for the exposure tests of electrodeposited lead coatings on steel made by Subcommittee II on Performance Tests of A. S. T. M. Committee B-8 on Electrodeposited Metallic Coatings.

Surface Texture Study of Electroplated Zinc. R. L. Lunt. Metal Finishing **45,** 68–70, 72 (August, 1947).
Presents a photomicrographic study of electroplated surface textures. The factors which influence surface texture and smoothness on strip and sheet steel are given. The work represents an investigation of zinc and zinc-alloy plating from acid baths.

Electrometallurgy Devoted to the Electrodeposition of Metals. E. R. Thews. Metal Industry **71,** 91–92 (August 1, 1947).
Discusses the use of insoluble and cast anodes, their shape and characteristics, and their solubility.

Chevrolet Increases Nickel Plating on Bumpers. Larry Strong and H. F. Reves. Products Finishing **11,** 20–22, 24, 26 (August, 1947).
Describes equipment and procedures in Electroplating Department of Forge, Spring, and Bumper Division, Detroit. Minimum thickness of plate is now triple that of recent previous specifications.



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Life of Chromium Plating Baths Containing Hydrofluosilicic Acid. K. Gebauer and K. Sommer. Metalloberflaeche **1,** 25–27 (February, 1947).
Gives details of results of an experimental study, including the influence of antimony from hard-lead anodes upon the quality of the plate. Work included a large-scale experiment on 3200 gallons of electrolyte. Operating data covering a ten-month period are given. Economics are compared with those of sulfate baths.

Chromate Passivation of Sprayed Zinc Castings. E. E. Halls. Metal Treatment **14,** No. 51, 164–168 (1947).
Sprayed zinc coatings, 0.001 to 0.010 inch thick, applied by the wire, powder or molten-metal processes are extensively employed as protective coatings on iron and steel. They may be passivated in a solution of 200 g sodium dichromate and 66 ml conc. sulfuric acid per liter of water at normal shop temperature with the usual immersion period. Tests indicate an optimum treating time for each solution, longer time resulting in a slightly less protective coating. They also indicate that air drying finishes, such as cellulose lacquers, should be employed to avoid deterioration of the chromate film.—L. H. SEABRIGHT.

Determination of Sulfide Content in Bright Cynide Zinc Plating Baths. S. B. Anisimov and L. P. Intson. Zavodskaya Laboratoriya **12,** Nos. 7-8, 756-757 (1946).
Describes a volumetric method for sulfide sulfur in bright cyanide zinc baths which contain sodium sulfide as a brightener.

Certain Properties of the Glass Electrode. L. E. Levin. J. Phys. Chem. (U. S. S. R.) **21,** No. 3, 337-341 (1947).
Microscopic investigation indicates that an aerosol is deposited on the inside surface of the glass ball during production of the electrode. This is believed to result from the evaporation from the hot glass surface of NaOH which is formed by reaction of Na_2O and water vapor diffused into the melted glass from flame gases. As a result, the outside and inside surfaces differ, causing an asymmetric potential. 12 ref.

Electrolytic Polishing of Silver. R. Shuttleworth, R. King, and Bruce Chalmers. Metal Treatment **14,** No. 51, 161–163 (1947).
Satisfactory polished surfaces were obtained by electrolytic polishing of the as-rolled silver surface without preliminary polishing. Electrical connection was made with a silver wire which fits into a hole drilled in the corner of the specimen. The electrolyte contained 35 g silver cyanide, 30 g potassium cyanide, and 38 g potassium carbonate per liter. The optimum current density and voltage must be found by trial in each cell. When the potential is applied, the initially high current falls rapidly. The surface darkens

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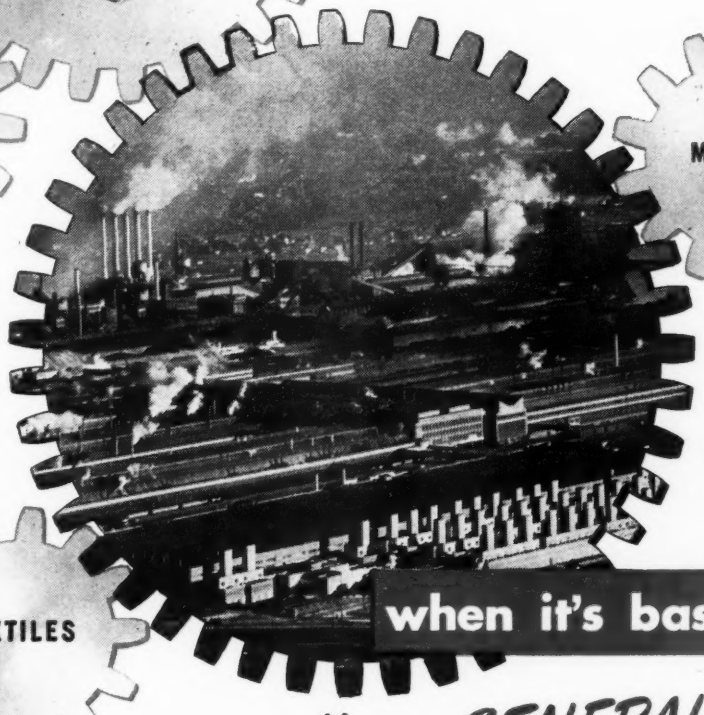

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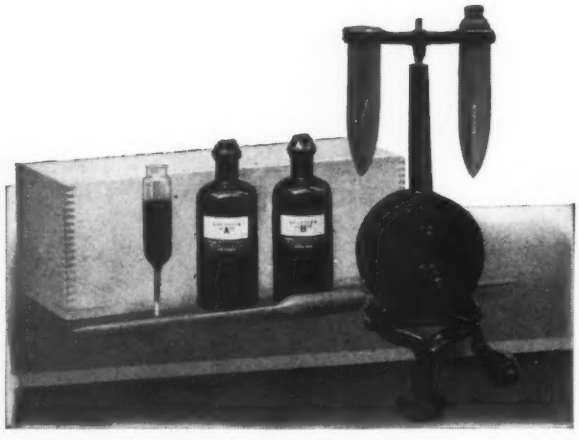

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until at the end of ten minutes it is a grey green. At this stage the specimen is removed quickly from the electrolyte without switching off the current. The film is then removed with a piece of wet velvet. Microscopic examination shows that the surface is smoother, but that traces of the original scratches still remain. The specimen is electrolytically polished for another ten minutes and this time washed and dried in alcohol. It is essential that the polishing be done in two stages and the deposited film removed between the stages. Polishing is possible only when the specimen is horizontal and the under-surface is being dissolved. The polished specimens may be etched in the same cell by reducing the voltage to about one-third.—L. H. SEABRIGHT.

Stress Cracking of Electroplated Lockwashers. K. B. Valentine. Trans. Am. Soc. Metals **38,** 488–504 (1947).
Presents data from tests made on electroplated lockwashers concerning the effects of hardness variations on stress cracking. Recommended procedures are given for eliminating hydrogen embrittlement by thermal aging.

Rhodium—Engineering Properties and Uses. L. B. Hunt. Metal Ind. **71,** No. 17, 339–342 (1947).
The hardness of worked and annealed rhodium is of the order of 100 Vickers, that of the electrodeposited metal 775–820 Vickers. Extended life tests with rubbing surfaces of electrodeposited rhodium have shown only a slight polishing action. Rhodium is completely resistant to nearly every common acid including aqua regia, the only corroding agent which readily attacks it being fuming sulfuric acid at 300° C. It imparts a fine white lustre to polished metal surfaces and can be deposited directly on silver, nickel, brass, nickel-silver, phosphor bronze, beryllium-copper and similar copper alloys, but not on tin, lead, zinc, cadmium, aluminum, iron or steel, which require a preliminary deposit, preferably of silver. The heaviest rhodium deposit usually considered practical is 0.00- inch, while for protection against tarnishing 0.0000152 0.00002 inch is generally found adequate.—L. H. SEABRIGHT.

Treatment Works for Plating Wastes Containing Toxic Metals and Cyanides. George E. Barnes. Water and Sewage Works **94,** 267–271 (August, 1947).
Describes briefly the processes that have been developed and works that have been constructed to treat the plating wastes from Talon, Inc. Starting with simple provision for neutralizing the spent pickling liquors with lime, improvements were begun to remove cyanides and chromium along with other toxic metals such as copper and nickel. There is now under construction at Meadville a new multi-purpose treatment works for complete treatment of all the wastes, designed on the basis of cumulative operating experiences. Its fundamental features are described.

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Patents

By GEORGE B. HOGABOOM
Consultant, New Britain, Conn.

No. 2,433,723, December 30, 1947—Solution for Smoothing Zinc Surfaces—T. J. Wieczorek.

My improved composition may be employed on zinc surfaces generally. For example, these surfaces may be presented by a zinc die casting, by a zinc plating deposited electro-galvanically in a zinc sulfate-acid bath (in which instance the deposit is usually gray and slightly rough) or by a zinc plating produced in a zinc cyanide-sodium cyanide bath (in which instance the surface is also gray and dull in appearance). It may also be employed to improve the lustre of surfaces of so-called bright zinc deposits which may be plated from zinc cyanide-sodium cyanide baths by the addition of suitable metallic addition agents and suitable organic addition agents.

The following example will illustrate the process.

SOLUTION A (CONTROLLED ACID DIP):

Chromium trioxide	2.0	lb.
Concentrated sulfuric acid	2.5	fl. oz.
Glacial acetic acid	1.0	fl. oz.
Water to make	1	gal

SOLUTION B (CAUSTIC DIP):

Sodium hydroxide	8	oz.
Water to make	1	gal.

The article is dipped in solution A, rinsed, dipped into solution B, and again rinsed and then dried.

CLAIM 1. A composition for smoothing zinc surfaces comprising an aqueous solution of glacial acetic acid, sulfuric acid, and chromium trioxide in substantially the respective proportions 1 fl.oz., 2.5 fl.oz., and 2 lbs. per gallon of water.

1 claim, 3 cited references.

No. 2,434,021, January 6, 1948—Process of Bright Dipping—M. M. Thompson and W. E. Moline, assignors to National Cash Register Company, Dayton, Ohio.

CLAIM 1. The process of bright-dipping and deburring objects of brass which includes the step of subjecting the objects to the action of a bath which is an aqueous solution consisting of, for each gallon of the solution, 27 ounces of sodium bichromate, 27 ounces of sodium nitrate, 40 ounces of sodium bisulfate, and the remainder water, and which is of sufficiently weak acidity at normal room temperature that it will not appreicably attack objects left therein for as long as twenty-four hours but which becomes more active through ionization upon increase of temperature until at about 130° F it becomes effective as a bright dip; and the step of maintaining the bath at a temperature selected between 130° F and the boiling point of the

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bath, depending upon the desired ionization and the rate of action of the bath on the object, whereby a high degree of control of the process is obtained and damage to the objects caused by unduly severe etching of the articles can be avoided.

4 claims, 9 cited references.

No. 2,435,525, February 3, 1948—Electrodeposition of Silver from a High Silver Cyanide Content Bath—J. S. Williams and W. R. Binai, assignors to P. R. Mallory & Company, Inc., Indianapolis, Ind.

This invention relates to silver electrodeposits and means for obtaining them and particularly to the thicker types of deposits such as are suitable for bimetals, inlays, overlays, silver lined bearings, electric contacts, commutators, slip rings and other types of silver deposits. We have found that silver plated steel shells made according to the present invention can be used successfully for bearings for airplane engines. The silver can also be deposited in the form of inlays in copper base backings for use as electric contacts.

Before silver plating it is desirable to apply a copper strike in a copper cyanide bath followed by a rinse and a dip in cyanide solution free from copper and silver. A silver strike is then immediately applied before the surface has a chance to dry.

Silver Strike Bath

Silver cyanide	2.0 to 2.75 g/l
Free potassium cyanide	150 to 180 g/l
Potassium carbonate	15 to 20 g/l
Current density	30 asf
Time	20 seconds
Temperature	90° to 95° F

CLAIM 8. *Plating Bath*

Silver cyanide	90 to 115 g/l
Free potassium cyanide (of amount of silver cyanide used)	20 to 150%
Potassium carbonate	Trace—80 g/l
Potassium hydroxide sufficient to give *p*H	12.6 to 13.4

9 claims.

References Cited in File: Trans. Electrochem. Soc. **59**, 303–305 (1931); **80**, 464, 467, 474 (1941). Metal Ind. 275–277 (March 22, 1940).

No. 2,435,714, February 10, 1948—Electrochemical Salvaging Method—A. J. Fusco and J. L. Bleiweis, assignors to Bendix Aviation Corporation, South Bend, Ind.

CLAIM 2. A method of salvaging an article of manufacture formed of aluminum and having a broken tool part embedded therein formed of steel, comprising the steps of supplying a solution of ammonium sulfate in water in contact with the embedded part, projecting an electrically conducting member into said electrolyte adjacent the embedded part and in spaced relation thereto, providing an external source of electromotive force, electrically connecting said mem-

ber and part to said external source of electromotive force so as to charge negatively said member and positively charge said part to effect disintegration of said part, circulating the electrolyte in the immediate region of the part so as to dissociate therefrom the disintegrated portions of said part and carry said portions away and free from said article, and adjusting said member in relation to said part so as to maintain a substantially constant distance between said member and part.

2 claims, 1 figure.

References Cited in File: U. S. Patents Nos. 2,156,-156; 1,329,315; 1,416,929; 1,845,052; 2,196,133; 898,-404; 2,157,699; 1,319,928; 656,982; 2,162,789. British Patents Nos. 325,003; 299,298; 482,563; 3,722. German Patent No. 315,667.

Pirani et al, Z. Metallkunde **16**, 132–133 (April 1924); Loose, Electrochem. Soc. Preprint **81**–6, p. 65 (April 20, 1942); Gardam, Metal Ind. (London) 485-486 (November 12, 1937).

No. 2,435,872, February 10, 1948—Method of Electroplating Cylinders–Silas Coulson.

This invention relates to the electroplating of rotogravure printing cylinders and is directed more particularly to the provision of a method whereby thin copper shells taken from rotogravure cylinders, that have been etched and that have served their purpose, may be employed as anode copper for the plating of the same or another cylinder.

An important feature of the present invention resides in the fact that all parts of the anode copper are at substantially uniform distances from the cathode in contradistinction to the use of deep anode scrap baskets of prior practice.

CLAIM 6. In the art of electroplating cylinders wherein electric current is passed through an electrolyte from an anode across an intervening space to the contiguous surface of a cathode cylinder to be plated, the method which comprises: physically stripping a plurality of electrolytically deposited shells from a corresponding number of previously plated cylinders, folding back the lateral margins of each shell respectively upon themselves to provide reinforced lateral edges on each shell, then folding each shell substantially medially of its width to bring the lateral halves thereof into substantially face abutting relation, interfoliating said shells, physically manipulating said shells into flattened arcuate form, and holding the thus assembled manipulated shells in substantially coaxial spaced relation to the cylinder to be plated while feeding the positive electric current to the shells to cause them to serve collectively as the anode.

9 claims, 17 figures.

References Cited in File: U. S. Patents Nos. 426,788; 460,354; 519,595; 791,341; 908,237; 1,029,965; 1,574,-188; 1,836,368; 2,011,638; 2,055,070; 2,155,392; 2,195,-096; 2,335,060. British Patents Nos. 122,433; 324,326; 740,064.

Trans. Am. Electrochem. Soc. **30**, 135–144 (1916).

No. 2,435,967, February 17, 1948—Bright Alloy Plating—George W. Jernstedt, assignor to Westinghouse Electric Corporation.

The electroplate alloy is surpassed only by silver in reflecting . . . The corrosion resistance of the ternary alloy electroplate is superior to nickel, tin, chromium and silver when these latter metals are plated on copper or copper alloys . . . An additional advantage of the ternary alloy applied to copper, in particular, is that the alloy can be soldered to as effectively and easily as to turned parts . . .

The electroplating of the ternary alloy in the electrolyte of the above composition (see Patent 2,436,-316) may be carried out with greatly improved results if addition agents are added to the electrolyte. It has been discovered, in particular, that the electrodeposit is rendered more continuous, more uniform and brighter, whereby a more corrosion resistant coating is produced with less pitting if certain betaine compounds are added. Betaines include the N-trialkyl derivatives of amino acids. For the purpose of this invention, betaines which have given the best results are those which have at least one non-cyclic hydrocarbon radical containing from 10 to 20 carbon atoms. For example, trimethyl-C-decyl alpha betaine is a suitable addition agent.

CLAIM 1. An electroplating bath for depositing a bright silvery alloy plate composed of 50 to 75 per cent copper, 15 to 30 per cent tin and 5 to 20 per cent zinc comprising in combination an aqueous electrolyte composed of from about 0.5 to 5.0 oz of free cyanide per gallon, 0.2 to 0.5 oz of copper per gallon, 0.05 to 0.2 oz of tin per gallon, 0.1 to 0.5 oz of zinc per gallon, alkali metal hydroxide, and 2.0 to 12.0 oz per gallon of an alkali metal carbonate, the electrolyte being maintained at a *p*H value of from about 11 to 13, and an anti-pitting and brightening agent composed of from 0.01 to 1.0 oz per gallon of a betaine having at least one non-cyclic hydrocarbon radical which contains from 10 to 20 carbon atoms.

2 claims.

References Cited in File: U. S. Patents 2,181,773; 2,198,365; 2,255,057; 2,287,654.

No. 2,436,244, February 17, 1948—Metal Working and Stripping Plating Process—H. L. Benner and R. B.

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Bair, assignors to E. I. du Pont de Nemours & Company, Inc.

An object of the present invention is to provide an improved method for stripping copper and copper alloys from steel and other metal bases coated therewith. Another object is to remove copper coatings from steel articles which have been copper coated and then case hardened, so as to completely remove the copper to have a clean, unblemished steel surface. Another object is to remove copper and other copper alloys, especially gilding metal, from a steel base and to recover copper or alloy in the metallic form without substantial change in composition. Another object is to strip electrolytically copper and copper alloy coatings from metal bases and simultaneously deposit the copper or alloy as a smooth, dense electrolytic deposit of high quality.

Bath Ingredients	*Preferred Range*	*Example*
CuCN	1 –12 oz/gal	6 oz/gal
NaCN (total)	1.6–17.2 oz/gal	9.1 oz/gal
NaCN (free)	0.6 –4 oz/gal	2.5 oz/gal
$Na_3PO_4.12H_2O$ (or its equivalent)	2 –16 oz/gal	8 oz/gal
Operating Conditions		
Bath temperature	40° to 90° C	80° C
*p*H of bath	10.9 to 13.0	12.0
Anode current density	up to 135 asf	95 asf
Cathode current density	1 to 50 asf	50 asf
Voltage	up to 2.5 volts	1.5–2 volts

CLAIM 1. In a metal treating process, the steps comprising copper plating a metal article other than a copper article, subjecting said article to at least one metal treating process and simultaneously removing copper from the so-treated article and plating copper onto another untreated article by constituting said treated article as anode and said untreated article as cathode in a cyanide copper plating solution comprising essentially dissolved alkali metal copper cyanide in a concentration equivalent to about 2 to 20 oz/gal of copper cyanide (CuCN), free alkali metal cyanide equivalent to 0.6 to 4 oz/gal of sodium cyanide and phosphate ions equivalent to 2 to 16 oz/gal $Na_3PO_4.12H_2O$, while maintaining said solution at a *p*H of 10.9 to 13.0 and at a temperature of about 75° to 85° C and maintaining the voltage of the electric current at about 1 to 2.5 volts.

4 claims, 7 examples of solution composition.

References Cited in File: German Patent No. 678,013. Metal Ind. **23**, 452 (November, 1925).

Equipment & Supplies

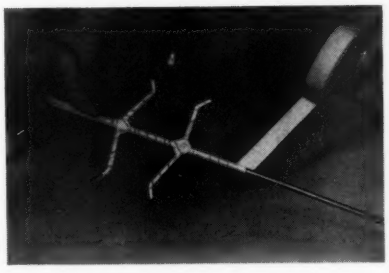
E—43. **Synthetic Detergent**—The use of Cerfak Liquid, a synthetic detergent produced by E. F. Houghton & Company, 303 W. Lehigh Avenue, Philadelphia 33, Pa., is said to result in unusually complete cleaning of oil quenched parts at exceedingly low cost. For further information, use Reader Service Card.

E—44. **Paint Heater.**—Bede Products, Inc., 3309 W. 118th Street, Cleveland 11, Ohio, offers the Trirex Paint Heater to reduce the viscosity of paint for spraying. The paint flows through ten feet of copper coil which is immersed in an electrically heated (1000 watt unit for 110 or 220 volts), thermostatically controlled water tank with latest safety devices. A ten-day trial period is allowed on receipt of purchase order. For further information, use Reader Service Card.

E—45. **Electroplating Pulse Selector.**—Designed for application in electroplating production or research, the Hill Cross Pulse Selector manufactured by Hill Cross Company, 22 Spruce Street, New York 7, N. Y., permits periodic reversing of direct current. Two synchronous-motor timers are coordinated to actuate instantaneous changeover between paired power circuits. Each timer may be set, individually and on a permanently calibrated dial, to close its circuit for any time period between ¾ and 15 seconds. A toggle switch turns the unit on and off, another reverses the direction of alternate pulses, and a third selects continuous or pulsing current. Terminals are provided for entering one of the power circuits. A resistor or rheostat may be connected across them to make alternate pulses at higher, or lower current, in either direction. With the terminals open the unit operates as a periodic interrupter. By connecting a transformer or variable frequency alternator, still other combinations are possible.

The smallest unit, rated 50 amperes at 15 volts d.c., is enclosed in a wall-mounting steel cabinet 14 x 14 x 5 inches. Similar units are supplied with an additional timer to shut off current at a preset interval after starting by external push-button. Various timing ranges and any higher current capacity can be furnished. For further information, use Reader Service Card.

E—46. **Plastic Film Tape for Rack Insulation.**—A new tape designed as a wrap insulator for electroplating racks and for blocking off parts being plated is now being distributed nationally by Minnesota Mining and Manufacturing Company, St. Paul, Minn. Trade-marked "Scotch" Plastic Film tape, the new product is offered in yellow, black and white films, all reported to have "excellent resistance" to acids, alkalies, water, salt water, alcohol, aliphatic hydrocarbons, and oils. The yellow variety has been specially formulated to meet the severe requirements of the electroplating trade. It is said to provide insulation protection in operations such as zinc, silver, chromium, cadmium, copper, and



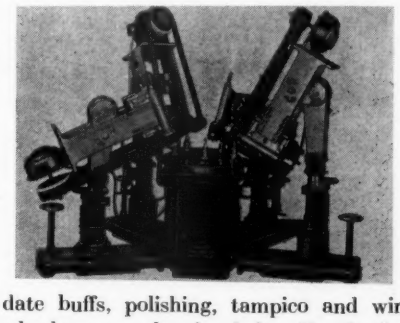
nickel plating, pickling, descaling, electrocleaning, electrolytic polishing, anodizing, hydrofluoric acid and other etching treatments.

The 0.007 inch thick tape is sold in 36-yard rolls, in widths from a quarter-inch to 22 inches. For further information, use Reader Service Card.

E—47. **Electric Vapor Degreaser.**—The Phillips Manufacturing Company, 3475 Touhy Avenue, Chicago 45, Ill., announces the Model 24, a newly designed electric vapor degreaser which is engineered for high efficiency degreasing of

small parts. Said to be outstanding for low initial and operating costs, the Model 24 is sufficiently light in weight and small in size to be conveniently moved to any part of the plant where suitable electric power and water connections are available. It is estimated that this compact unit will remove grease, oil and other contaminants from 400 pounds of steel per hour. It is equipped with the patented Reso-Kleen Sump which permits continuous distillation and reclamation of soiled solvent within the degreaser while the unit is in operation.

E—48. **Abrasive Belt Head for Automatic Polishing Machine.**—A special abrasive belt head for automatic polishing and buffing is announced by the Packer Machine Company, Meriden, Conn. The new interchangeable head permits various types of wheel applications as well as the use of abrasive belts. Standardization of mounting design makes it adaptable to most types of Packer-Matics now in use. The ability of these machines to handle changes in product design without necessitating any change in equipment is thus greatly increased. The flexibility of the new abrasive belt head permits automatic buffing and polishing of such items as door knobs, cooking utensils and die-castings in a single operation. The new head will accommo-



date buffs, polishing, tampico and wire wheels or an abrasive belt. For further information, use Reader Service Card.

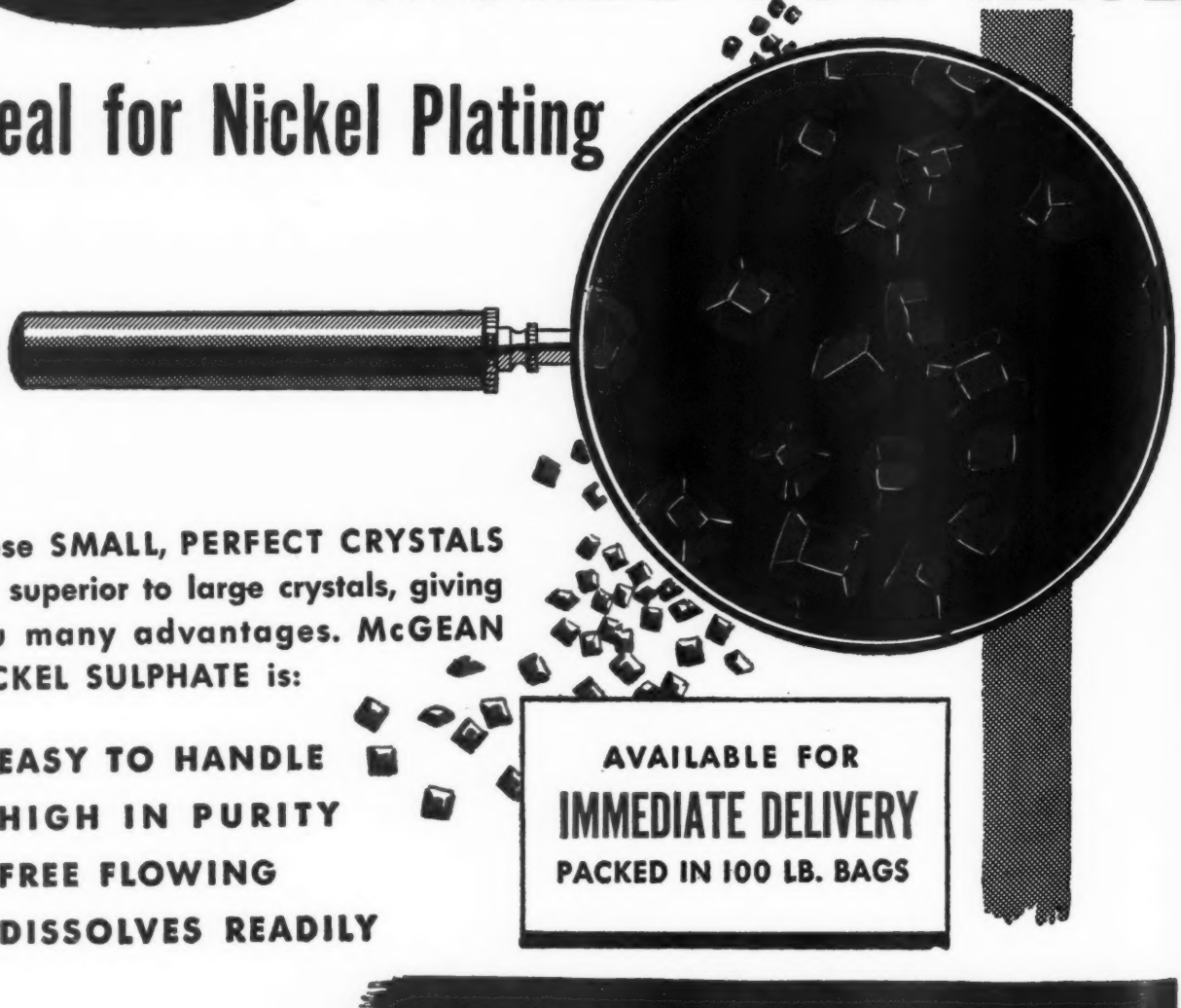
E—49. **Cleaning Aluminun Parts for Spot Welding and Painting.**—An efficient method of preparing aluminum for spot welding and painting, of protecting finished work against corrosion, and of obtaining smooth, lustrous finishes, is discussed in an article appearing in a recent issue of Oakite News Service, house publication of Oakite Products, Inc., 140 Thames Street, New York 6, N. Y. Special reference is made to procedures employed in a large Eastern plant manufacturing automatic phonographs, where oils, greases, identification marks, fingermarks and oxides must be removed from aluminum parts before spot welding and painting. Thorough removal of these contaminants from such parts as braces, coin box assemblies, etc., is accomplished by the use of a specialized alkaline material, followed with a deoxidizing treatment which leaves the material in a state of low and uniform resistance, the article reports. For further information, use Reader Service Card.

E—50. **Industrial Fans.**—The new and complete line of "Axivane" adjustable-

"Tops"

McGEAN NICKEL SULPHATE

Ideal for Nickel Plating



These SMALL, PERFECT CRYSTALS are superior to large crystals, giving you many advantages. McGEAN NICKEL SULPHATE is:

- EASY TO HANDLE
- HIGH IN PURITY
- FREE FLOWING
- DISSOLVES READILY

AVAILABLE FOR
IMMEDIATE DELIVERY
PACKED IN 100 LB. BAGS

The McGEAN CHEMICAL COMPANY
REPUBLIC BUILDING CLEVELAND 15, OHIO

blade fans, Series 1000, for all heating, ventilating, and air conditioning requirements is manufactured by Joy Manufacturing Company, Henry W. Oliver Building, Pittsburgh 22, Pa. The axial-flow units of the vane-axial type are designed for pressures to 9.60 water gauge and volumes up to 100,000 cfm.

Adjustable blades insure greater flexibility in performance, and a simple, compact design with direct-in-line drive lowers installation costs, minimizes space requirements, and develops maximum volume and pressure per pound of fan and motor. The fans are available in 124 different models, with various combinations of 15 different housing diameters (18 to 60 inches), 4 hub sizes, 16 motor-frame sizes, and 4 different speeds. For further information, use Reader Service Card.

E—51. Booster Fans for Paint Spray Booths.—Series DXB Booster Fans for use in paint spray booths for removal of fumes or in areas where there is excessive heat are available in five sizes. These include units of 16, 20, 24, 30 and 36 inch propeller diameters with rated capacities of 2000, 2500, 4400, 7400, and 9500 cfm respectively.

According to the manufacturer, Chelsea Fan and Blower Company, Inc., 1200 Grove Street, Irvington, N. J., construction is rugged and operation extremely quiet for units handling such large volumes of air. Fan shafts and motors are ball bearing mounted, and the fans are designed for vertical or horizontal operation. Blades are of non-ferrous metal. For further information, use Reader Service Card.

E—52. Vertical Spindle Grinder.—The Standard Electrical Tool Company, 2525 River Road, Cincinnati 4, Ohio, announces a redesign of its Vertical Spindle Grinder. The sectional view illustrates the thrust bearing construction which includes the threaded nut "N" which permits fractional thousandths adjustment by releasing set screw "S" to take up wear on the bearings externally without removing the wheel or any parts. The grinder, equipped with precision ball bearings, is made in sizes from ½ hp to 15 hp with individual speed of 1150, 1750 and 3450 rpm. For further information, use Reader Service Card.

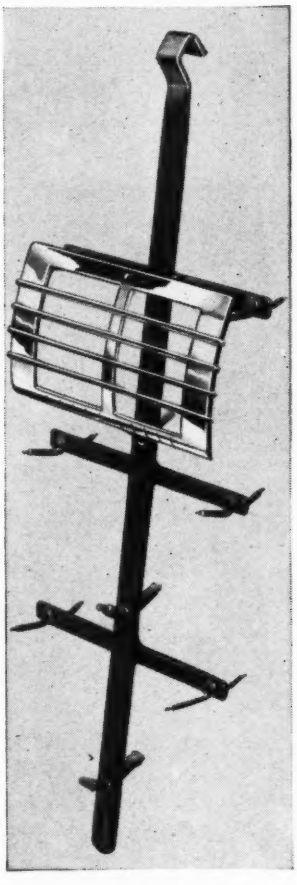
E—53. Electric Hoists. Rugged construction and low operating costs make the Ford "Whippet" Electric Hoists adaptable for many heavy duty lifting jobs, according to Ford Chain Block Division, American Chain and Cable Company, Inc., York, Pa. Capacities range from 250 to 2,000 pounds. They can be furnished with trolleys either parallel or cross mounted, and, in addition, with hook suspension or for rigid or belt suspension. Standard lift is 12-foot; however, 20-foot lift can be furnished when specified.

Significant features of the units embrace safe holding of load; minimum wear and uniform operation at any point of travel; automatically controlled jaw-type motor brake with solenoid-operated braking shoes; no overlapping of cable with standard lift. Fully enclosed in controller housing, in heavy duty crane-type safety-limit-stop prevents over-travel of hook by returning controller to neutral. A push-button control with messenger tow chain supports push-button station and is used to pull loaded or unloaded hoist along runway beam. Motors conform to N. E. M. A. standards. For further information, use Reader Service Card.

E—54. Selenium Rectifiers.—Mellaphone Electronic Rectifier Company, 1460 E. Main Street, Rochester 2, N. Y., offers a new line of low voltage, high current rectifiers for operation from 220 or 440 volt, three-phase, ac lines. The dc output voltage can be varied from 0 to 6 volts with a capacity of 600 amperes or from 0 to 12 volts with 300 amperes capacity. Intended primarily for use in electroplating and electrolytic cleaning, the selenium rectifier elements are thoroughly sealed. A heavy duty variable voltage transformer provides smooth stepless control over output voltages from 0 to maximum setting. Each unit is complete and includes large 4½-inch ammeter and voltmeter and protection against overloads and failure of ventilation system.

The rectifiers are claimed to withstand considerable overloading without overheating of either transformers or rectifier

NEW RACK INSULATION



SAVES

Time • Labor Costs

Racks last longer because the heavy insulation protects the rack. A single dip gives a coating many times the thickness of ordinary insulation. A rack can be completely insulated in two hours. Time is saved and labor cost greatly reduced.

100% Solids

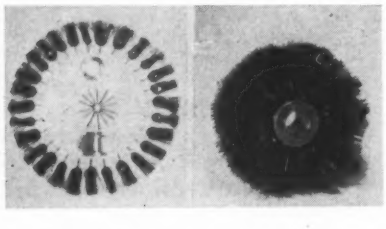
This new insulation is a paste that dips freely but picks up a heavy coating with a single dip. Then requires a short bake to convert the paste to its final tough condition. BUNATOL No. 1000 Paste is all solids—nothing to evaporate—no loss. Insulation is very tough and long lasting and has excellent resistance to all plating solutions and cleaners. Neutral and no effect on any solution. Write for information and sample.

Nelson J. Quinn Company Toledo 7, Ohio

BUNATOL

stacks. For further information, use Reader Service Card.

E—55. Steel Wire Tufts for Satin Finish Hanger Brushes.—The Hanson-Van-Winkle-Munning Company, Matawan, N. J., announces an improvement in its satin finish hanger brushes. Each tuft will now be supplied with a properly attached S-hook which will provide the swing



action required for a smooth satin finish. The tufts are mounted on rods which are parallel to the axis of the hub. Formerly the user had first to open one end of the S-hook, slide it through the eye of the tuft, and then close the S-hook with a pair of pliers in order to be sure that there was a good tight connection between the S-hook and the tuft, a tedious chore. With the S-hook properly attached, this loss of time will be eliminated and production increased.

E—56. Flow Control for Water, Oil, Gas, Air.—The "Mesurflo" Control with the "Straitflo" strainer manufactured by Hays Manufacturing Company, Twelfth and Liberty Streets, Erie, Pa., automatically measures predetermined amount of flow regardless of variable pressures, thus eliminating unnecessary waste. By subduing excessive pressure "hammer", it is said to eliminate deterioration of valves and equipment and to reduce operation cost of appliances or equipment. The control automatically absorbs variable pressure flows, permits simple timing mechanism for measured quantities, and maintains constant flow regardless of pressure when supply is open.

Bronze coupling, copper tube body, monel strainer, non-corrodible orifice plate, molded rubber diaphragm, and asbestos-neoprene gaskets are components of the control. For further information, use Reader Service Card.

E—57. Vertical Unit Heater.—The seven models in the new "Vertiflow" line manufactured by Young Radiator Company, Racine, Wis., were designed to deliver from 52,600 to 562,000 btu per hour under standard operating conditions. This large capacity, augmented by the unique design features of the unit, affords maximum efficiency with heat being delivered from heights heretofore considered impractical. The specially designed fans draw room air through the open ventilating stack, while at the same time directing the air taken from the heated core downward through the fan opening. The flow of air around the motor reduces its operating temperature as much as 75° F. When motor is off, the core-heated air rises and, in passing over the top opening of the ventilating stack, forms a natural draft. Cooler room air is drawn up through the stack providing for continuous cooling of motor. By this method of cooling "motor-baking" common to vertical discharge type units is eliminated. For further information, use Reader Service Card.

E—58. Carbon Dioxide Fire Extinguishing System. — American-La France-Foamite Corporation of Elmira, N. Y., announces a completely new carbon dioxide system for protecting Class "B" and "C" risks requiring localized or total flooding and rotating electrical units requiring a sustained discharge of carbon dioxide. This new system, according to the manufacturers, automatically shuts off power units and closes windows and doors when fire strikes, but only after first sounding an alarm to permit employees' exit from the fire area. Then the system discharges its fire-killing carbon dioxide. For further information, use Reader Service Card.

E—59. Drum Tilt Rack.—Industrial Products Company, 2813 N. 4th Street, Philadelphia 33, Pa., offers a tilt type, one-man operated drum and barrel drain stand. In horizontal positions, the drum spigot is approximately 18 inches from the floor. Ease of operation is said to prevent personal injuries, save time and allow complete drainage of liquids, all three being essential to lower production costs. Ruggedly built of rigid angle iron

ANNOUNCING

Divine

BELTFLEX

CONTACT WHEELS

Give positive polishing action on light contour and radius work where resilient action is necessary.

FLEXIBLE—They mold the belt to the work surely and effectively.

BALANCED—for smooth running, and to give constantly accurate pressure to the working surface. A smoothly ground face assures uniformity.

TWO DEGREES OF DENSITY—one offering greater flexibility, the other more aggressive cutting action . . . both giving pliability and resilience beyond standard contact wheels.

WIDE SIZE RANGE—face widths and diameters for most requirements. Wheel equipped with metal hub. Generally most effective when used with Jeans Cloth (J weight) belts.

Divine Brothers Company

UTICA 1, N.Y., U.S.A.

construction with electric welds, it is equipped with two wheels and two swivel casters for convenient moving to any location. For further information, use Reader Service Card.

E—60. New Plating Rack Tip.—Claiming the advantage of no disturbance to the main rack insulation material by its removal, a new type of removable tip for plating racks has been developed by the National Rack Company of Fairlawn, N. J. The new work holder is said to be so designed that it can be easily replaced when an excessive amount of plate has built up on the holder or when another type holder is necessary to plate parts of differing shape. The insulation, severed only at the actual point of removal, is resealed by brush application of the insulating material. For further information, use Reader Service Card.

E—61. Contact Wheel for Abrasive Belt Polishing.—A new contact wheel is manufactured by Divine Brothers Company, 200 Seward Avenue, Utica 1, N. Y., under the name of "Beltflex". It has been designed to eliminate the necessity of using buff sections under abrasive belts but is said to have all of their advantages plus controlled balance and density and a smoothly ground surface which makes for uniform belt tracking. The Beltflex Contact Wheel is available for prompt shipment in two densities, type "E" offering great flexibility, type "G" with flexibility and aggressive cutting action. Face widths and diameters for most requirements are available. Recommended for use with J-weight (jeans cloth) abrasive belts. For further information, use Reader Service Card.

E—62. Rust-inhibiting Spraying Primer.—The Stanley Chemical Company, East Berlin, Conn., offers a new type of rust-inhibiting primer and preparation coating designed for use under either air-dried or baked finishes. This material, called "Stantite" Spraying Primer No. 66R-3157A, is said to have outstanding adhesion to steel, stainless steel, galvanized iron (with no previous treatment), zinc, nickel, cadmium, brass, copper, aluminum (anodized or not), magnesium, glass, many molded items, and old finishing materials which are firmly attached to the base material. The adhesion of all types of topcoats to the primer has been found to be excellent. This includes air dry or bake lacquers, alkyds, ureas and melamines, enamels, japans, paints. (The one exception so far is a certain type of vinyl finish.) One major advantage of the primer is its ability to prevent the extension of corrosion underneath a topcoat broken by use or abuse. For further information, use Reader Service Card.

The New BLACK MAGIC Zinc Black
Protects Important Parts
ON THE WEBSTER-CHICAGO WIRE RECORDER

Black-Magic ZINC BLACK is used on the spool of the Webster-Chicago Wire Recorder shown below because it does not build up the diameter and is a good bond for the silk screen painted trade name.

Black-Magic ZINC BLACK is the modern treatment for zinc base die castings and zinc fabrications—as an attractive final finish and an effective corrosion and abrasion resistant. It is also an excellent bond for paint, and when so used, it affords full protection to unpainted areas.

Because of these advantages, Black-Magic ZINC BLACK is becoming "standard practice" wherever product sales and service life are important.

Black-Magic ZINC BLACK on the mandrel resists the abrasion of a felt brake which it engages, affording positive action without revealing bare metal.

Black-Magic ZINC BLACK, used on the take-up reel, resists the abrasion of the magnetic recording wire which rides on the periphery.

Write for the "Black Book" of details on our zinc black and other Black-Magic metal finishes. Also, for a first-hand acquaintance with this zinc black, suggest you send us a product for sample processing without obligation.

MITCHELL-BRADFORD CHEMICAL COMPANY
MODERN METAL FINISHES
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CHICAGO OFFICE: 111 W. Jackson Blvd.
BLACK-MAGIC OXIDE BLACKING SALTS
WITCH-DIP & WITCH-OIL FINAL FINISHES
SILCO Glass-Base PROTECTIVE COATING
HEAT TREATING SALTS. CLEANERS. ETC.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 233.

CLEAN-RITE
All-Purpose CLEANERS

ELECTROPLATING AND POLISHING EQUIPMENT
PLATING RACKS
BUFFS
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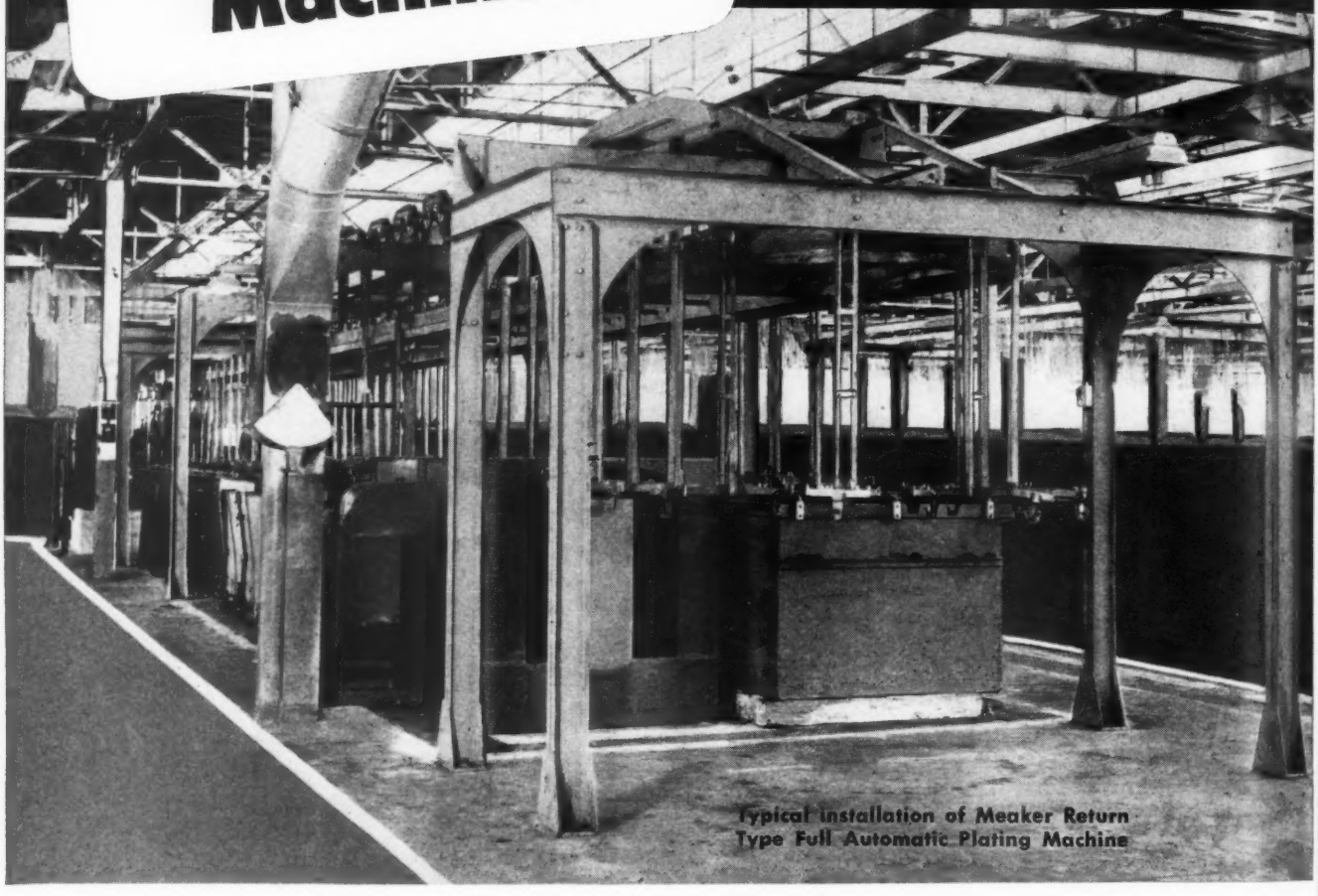
Electroplating Machines *tailored to fit*



Typical installation of Meaker Return Type Full Automatic Plating Machine

Equipment tailored to fit your own requirements is the only way to handle electroplating on a production basis. The Meaker method applies equally well to plants with only a moderate daily output and to the largest and heaviest automatic plating needs of the automotive industry. It offers a simple way to obtain uniformity in results.

Meaker Automatic Conveying Equipment is engineered and built for continuous use with minimum maintenance. It incorporates a flexibility for timing and synchronizing the various steps of the complete process.

Whatever your electroplating requirements, either small or heavy parts, the Meaker method offers the practical way for economical, quality production.

★ *Full Automatic and Semi-Automatic Electroplating Equipment*

★ *Strip Steel Plating Equipment*

★ *Wire Galvanizing Equipment*

★ *Strip Steel Electrocleaning Lines*

★ *Pickling Machines*

★ *Processing Conveyors*

★ *Motor Generators for Plating*

★ *Rectifiers for Plating*

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Slightly Used BUFFS

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ANY QUANTITY

ALL SIZES

MICHIGAN BUFF CO., INC.

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PLATING RACK SPECIALISTS

Featuring Removable and Replaceable Work Holders

REDDY-RACK
"Reddy-Rack" uses NATIONAL Racks.
The reading glass shows to "Reddy-Rack's" satisfaction, the replaceable work holder features that cuts cost and minimises rack problems.
NOTE: When computing savings while using National Racks, glass is not necessary.

WE MAKE THE RACK *YOU* WANT

Insulation makes possible the replacement of worn work holders without injury to the spline section of NATIONAL PLATING RACKS.

NATIONAL RACK *Company*

22-06 MORLOT *Ave.* FAIR LAWN, N. J.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 252.

New Literature

L—31. Chem-pure De-ionizer—Process Equipment Corporation, 307 N. Michigan Avenue, Chicago 1, Ill., offers a 4-page bulletin which describes briefly its system of water purification, including removal of carbon dioxide and silica. For your copy, use Reader Service Card.

L—32. Buff Cloth Bulletin FDB-3—A catalogue page, showing ten samples of cloth used for making buffs, has just been issued by Divine Brothers Company, 200 Seward Avenue, Utica 1, N. Y. These samples are the actual materials glued to the page in such a manner that they can be readily examined. Beside each swatch is a brief description of the recommended application. For your copy, use Reader Service Card.

L—33.—Wear and Surface Finish—This release, issued by Gisholt Machine Company, Madison, Wis., and written by E. L. Hemingway, is in reality a textbook on the subject of finishing. It covers the basic reasons for surface wear and its relation to surface finishing. Both the measurement of surface roughness and its correction by superfinishing are included. Because of limited distribution of this outstanding work, the manufacturer requires requests on company letterhead. Mention PLATING.

L—34. Drying Barrels and Sawdust Separators—A new 4-page bulletin issued by Belke Manufacturing Company, 947 N. Cicero Avenue, Chicago 51, Ill., gives complete information on Belke Steam-Heated Sawdust Drying Barrels and Belke Sawdust Separators for fast and efficient drying of small parts before and after electroplating. The sawdust barrels dry the work, leaving it bright, clean and free from water spots. The sawdust separators part the work from the sawdust quickly and with minimum labor. Also fully described is a new combination unit, a sawdust barrel with the separator attached that is said to afford even greater efficiency and labor saving. For your copy, use Reader Service Card.

L—35. Speedie Buffing and Polishing Compositions—Fabricators and manufacturers in the metal-working industry, interested in improving buffing and polishing operations, will find the new, 2-color, 20-page Bulletin 48-1 just published by The Buckeye Products Com-

A. E. S. Publications

"The Fundamentals of Electrochemistry and Electrodeposition" by Samuel Glasstone. Price $2.50.

Twenty authoritative chapters in simple language on the properties of solutions, Faraday's Laws, pH, electrode potentials, overvoltage, polarization, anode behavior, corrosion, etc. Successfully used for classroom instruction.

Proceedings of the American Electroplaters Society Vol. 33, 1946. Price $6.50.

Twenty-one papers on copper, nickel, rhodium and tin plating; plating of strip and wire screen cloth; electrocleaning and electropolishing; magnesium treatment and parkerizing; polishing and buffing; organic coatings, etc. A. E. S. Research Annual Reports.

Proceedings of the American Electroplaters Society Vol. 34, 1947. Price $10.00.

Fourteen papers and eight A. E. S. Research Annual Reports on barrel plating of nickel and chromium; brass, cobalt and nickel plating; zinc treatments; electroforming; buffing; physical properties of and stress in electrodeposits; plating room waste disposal; health hazards.

"Adhesion of Electrodeposits" by A. L. Ferguson. A. E. S. Research Reports Ser. Nos. 1 & 2. Price 60c and 40c respectively.

Detailed bibliography, general considerations, correlated abstracts of published and unpublished methods for measurement of adhesion.

"Determination of Impurities in Electroplating Solutions" by Earl J. Serfass and W. S. Levine. A. E. S. Research Report Ser. No. 3. Price 40c.

First in a series. Colorimetric techniques and methods for determination of lead, iron, manganese and copper in nickel plating solutions.

"Stripping of Copper from Various Base Metals" by F. C. Mathers, C. E. Landwerlen and E. C. Martin. A. E. S. Research Report Ser. No. 4. Price 35c.

Literature review and bibliography of a variety of methods.

"Porosity of Electrodeposited Metals" by N. Thon and E. T. Addison, Jr. A. E. S. Research Report Ser. No. 5. Price 80c.

Critical literature review and bibliography of chemical and physical methods with alphabetical index of test methods by metals.

"Specifications and Tests for Electrodeposited Metallic Coatings" sponsored by American Society for Testing Materials and American Electroplaters' Society. Price $1.25.

Specifications for zinc, cadmium, lead, and copper-nickel-chromium coatings on steel, copper-nickel-chromium coatings on brass and zinc base die castings, and chromate finishes on steel; methods for tests; and recommended practical for hard chromium plating and for preparing low-carbon steel for plating.

Send your order, with check, to

AMERICAN ELECTROPLATERS' SOCIETY

P. O. Box 168, Jenkintown, Pa.

pany, Speedie Division, Dept. P, Cincinnati 16, Ohio, filled with valuable reference data on polishing, buffing and coloring compositions and their use.

As an aid to polishing room foremen, purchasing agents and all concerned with finishing room operations and supplies, the book contains a full-page chart showing the correct polishing, buffing and coloring composition of each particular metal surface. Complete descriptions of the working qualities and practical applications of various types of compositions, including liquid compositions, are presented.

Convenient, too, is a section of many types of buffs and polishing wheels. Each is illustrated and described, and its appliion to a specific operation in the buffing room is given. A helpful table for computing the peripheral speed of a wheel is included. For your copy, use Reader Service Card.

L—36. Lead Anodes—The use of Divco 71-Point Lead Anodes is described in a new Divco technical Bulletin 8A, issued by Division Lead Company, Dept. 117, 836 W. Kinzie Street, Chicago 22, Ill., manufacturers of lead, solder and lead alloy products. For your copy, use Reader Service Card.

L—37. Automatic Boiler—A 4-page Bulletin 148 describes the Alert "Hot Steam" Automatic Boilers manufactured by Alert Engineering Products Company, 315 W. Woodbridge Street, Detroit 26, Mich. A package unit with oil or gas burner, it is available in sizes of 2 to 50 hp with steam pressure of 100 psi or higher if desired. For your copy, use Reader Service Card.

L—38. Pickling Inhibitor—Technical Service Data Sheet No. 13–1 describes the Rodine pickling inhibitors manufactured by American Chemical Paint Company, Ambler, Pa. For your copy, use Reader Service Card.

L—39. Anodizing Tank—One of the articles in "Storts and Distorts", house organ of Storts Welding Company, 42 Stone Street, Meriden, Conn., describes in detail a rubber and lead-lined anodizing tank for sulfuric acid anodizing. For your copy, use Reader Service Card.

L—40. Gas Mask Equipment—As a practical help to all users of gas mask equipment, the Acme Protection Equipment Company, 3037 West Lake Street, Chicago 12, Ill., is releasing a series of illustrated bulletins presenting a wide range of protection equipment for use in hazardous gas and smoke atmospheres. In addition to bulletins featuring the Acme Full-Vision gas masks and canisters, full information is provided on proper canisters to use for smokes, fumes, mists, organic vapors, acid gases, ammonia, etc., in a table of a long list of gases together with equipment recommended. For your copy, use Reader Service Card.

Branch News

Coming Events

BOSTON BRANCH

THIRTEENTH ANNUAL MEETING
Saturday, April 17 in Hotel Statler
Foregathering at 2:00 P. M.
Hosts: Mrs. Ann Baker Love, Len Chesworth, Dick Furbush
Diverting films
Educational Session at 2:45 P. M.
Current developments—Modern business methods
Banquet at 7:00 P. M.
Prime beef—Gifts
Stage Show with Barbara Davis Dancing
Ticket Reservations at $7.50: Dr. George P. Swift, 53 Galen St., Watertown, Mass.
Hotel Reservations: Walter L. Larsson, 1113 Statler Building. Boston, Mass.
MANSON GLOVER.

MILWAUKEE BRANCH

ANNUAL EDUCATIONAL SESSION AND BANQUET
Saturday, April 24 in Schroeder Hotel
Session at 2:00 P. M.
Symposium on Post-War Finishes
Mrs. Gladys Obendorfer, Gimbel Bros.
Mr. Frank K. Savage, Standard Plating Rack Company
Dr. R. B. Saltonstall, The Udylite Corporation
Dr. R. A. Schaefer, Cleveland Graphite Bronze Company
Banquet at 7:00 P. M.
FRED L. ANDERSON.

NEW ENGLAND REGIONAL MEETING

Saturday, May 1 in Taft Hotel
New Haven, Conn.
Technical Program in the afternoon
Dr. Samuel Glasstone, Boston College, Boston, Mass.
Mr. Cleveland F. Nixon, Head of Process Engineering, Fisher Body-Ternstedt Division, General Motors Corporation, "Operation and Control of Bright Nickel Solutions"
Banquet in the evening
Entertainment
HENRY STROW, *Chairman*

ROCHESTER, BUFFALO, SYRACUSE BRANCHES

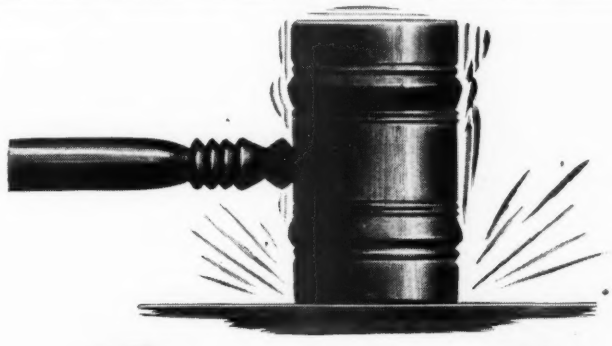
SPRING REGIONAL MEETING
Saturday, April 24 in Hotel Seneca
Educational Session at 2:00 P. M.
Mr. Kenneth M. Huston, Armco Research Laboratories, A. E. S. President—"Finishing of Stainless Steel"—"Affairs of the A. E. S."
Dr. D. Gardner Foulke, Hanson-Van Winkle-Munning Company—"Periodic Current Reversal"
Mr. Walter L. Pinner, Houdaille-Hershey Corporation—"The International Electrodeposition Conference in London"
Ladies' Program at 2:00 P. M.
Trip Through WHAM, Rochester's Radio City
Fashion Show
Banquet at 7:00 P. M.
Dinner—Entertainment—Dancing
Registration Fee: $3.00
Dinner: $3.50 JAMES E. WEAVER.

PITTSBURGH BRANCH

ANNUAL LADIES' NIGHT DINNER-DANCE
Thursday, April 8 at 7:00 P. M.
Don Metz Casino, 3802 Forbes Street
Unusual entertainment—Dancing—Door Prizes—Special gifts for the Ladies
Tickets at $4.00 per person from Mr. R. A. Dimon, 210 Semple Street, Pittsburgh
E. J. SMITH.

ROCKFORD BRANCH

SIXTH ANNUAL EDUCATIONAL SESSION AND BANQUET
Saturday, April 3, in Faust Hotel
Session at 1:30 P. M.
H. P. Conrad, Illinois Tool Works, Chairman
Three papers on Metal Finishing
Educational Movie
Banquet at 7:00 P. M.
Wm. Folley, Commercial Wire Products Company, Chairman
Dinner—Show with Doc Ringdon, Jimmy Valentine and Howie Lindstrom—Dancing to Jack Sweeney's Orchestra—Attendance prizes—Favors
Banquet Tickets at $4.00 per plate and table reservations (for 8) from Vern T. Wisson, Spring Creek Road, Rockford, Ill.



The Jury Reports

HERE'S A CASE where you are the judge and the jury. Shown in the photo are plating tanks equipped with Kirk & Blum Fume Control Systems. Note the clear, healthy atmosphere . . . the complete absence of fumes. Compare this view with fume-filled plating shops you have known—and there's not much question as to the verdict you'll render.

Write for descriptive booklet "Fan Systems for Various Industries." The Kirk & Blum Mfg. Co., 2887 Spring Grove Ave., Cincinnati 25, Ohio.

FOR CLEAN AIR . . . THE INVISIBLE TOOL
KIRK AND BLUM
FUME CONTROL SYSTEMS

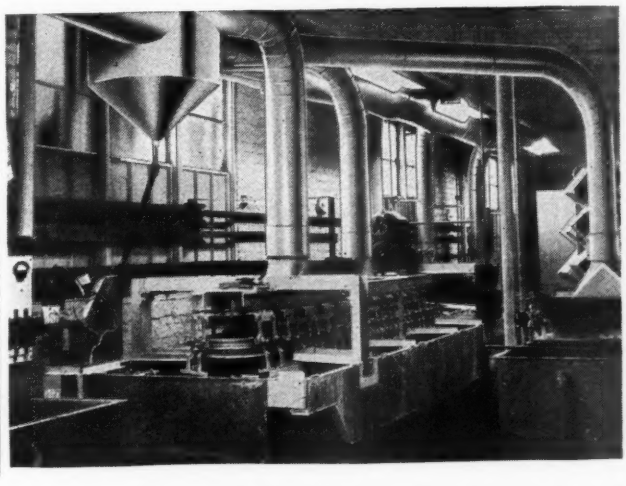


Illustration shows Kirk & Blum Fume Removal System and Plating Tanks at S. E. Overton Co., South Haven, Mich.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 256.

BALTIMORE-WASHINGTON BRANCH

MR. F. L. SCOTT of the United Chromium, Incorporated, spoke on "Organic Finishes and Protective Coatings" at the meeting on February 3 in the National Bureau of Standards. The principles involved in the preparation and use of resin dispersion coatings were discussed. Hydrasols, organosols, and plastisols are the three important types of dispersions on which we depend today for protection to plating racks and tanks.

Following the talk and discussion, cold drinks and sandwiches were served. Eighteen were present.

GRACE RIDDELL, *Secretary.*

BRIDGEPORT BRANCH

Among the business transactions at the Old Timers' Night Party in the S. S. Norden Club on February 8 were receipt of one application for membership and the granting of one out-transfer and two suspensions.

The entertainment arranged by BILL EHRENCRONA and his committee included several moving pictures of recent sports events, an excellent smorgasbord, and refreshments. Two old-timers, WILLIAM THOMPSON and WILLIAM FLAHERTY, spoke briefly.

J. G. STERLING, *Secretary-Treasurer.*

BRIDGEPORT BRANCH

The Open Meeting and Educational Session on February 20 was opened by First Vice-President C. L. TEMPLE with forty members and guests present.

The evening's speaker, MR. M. C. WELKER, Sales Supervisor of the Ion Exchange Products Department, American Cyanamid Company, of New York City, was introduced by TECHNICAL CHAIRMAN A. J. CHENIS. The address on "Demineralized Water in the Plating Industry" showed that all solutions can be freed from contamination by ion exchange. By this process it is even possible to use rinse water over again, thereby saving the cost of untold gallons of water. Movies showed many installations in operation, particularly in the silvering of glass mirrors and the textile industry. The session proved most interesting and provoked considerable discussion.

JOSEPH G.STERLING, *Secretary-Treasurer.*

BUFFALO BRANCH

The February 13 meeting was highlighted by the presence of MR. DOUGLAS HANNA of the Canadian Hanson-Van Winkle Company, Ltd., who served as director for a Round Table Discussion.

The most pressing problems facing platers today seems to be tied in with the inherent porosity of electrodeposits. DR. C. J. WERNLUND of E. I. du Pont de Nemours & Company outlined some of his work on the porosity of copper deposits which seems to be the primary cause for their failure. This led to a discussion of present methods for accelerated corrosion tests. The consensus was that the results of salt spray tests should be taken with a grain of salt (no pun intended). Various ideas were advanced as to the causes of plate porosity such as base metal condition, gas adsorption in the cleaning cycle, and particles in the bath.

The discussion of the feasibility of stripping of die castings for replating indicated that no commercial methods are yet available which are not accompanied by attack on the base metal. Even subsequent polishing operations do not seem to eliminate the resulting porosity in the casting because the stripping solutions often penetrate the thin skin of the casting exposing the porous matrix underneath. Even if such a casting could be plated without blistering, the exaggerated porosity of the plate would lead to an early failure in service.

Many other problems were discussed at this well spent evening.

H. A. FUDEMAN, *Secretary.*

CINCINNATI BRANCH

The regular meeting on February 25 at the Engineering Society's Headquarters was preceded by dinner and the viewing of a one-hour color film on "*Sport Fishing*", shown by MR. HOMER H. JONES. The pictures had been taken by Mr. Jones on his travels to many of the wonderful fishing spots in the West. Everyone was impressed by the beauty of the country and the high rate at which the fish were pulled in.

DR. CHARLES L. FAUST, Battelle Memorial Institute, Columbus, Ohio, gave a very informative talk on "Electropolishing", on which he has done research work for the past ten years.

There were forty-eight present at the dinner, and ninety-five at the meeting proper.

H. R. DAVIS, *Secretary.*

COLUMBUS BRANCH

MR. A. J. CHANDLER, Brush Division, Osborn Manufacturing Company, Cleveland, spoke on "Uses of Brushes in Plating and Finishing" at the February meeting of the Columbus Branch.

Mr. Chandler described the application of brush buffs in the treatment of base metals prior to electroplating. Brush buffs can also be used for finishing electroplated metal and are especially efficacious for parts having deep recesses and projections because they are more flexible than cloth buffs and thus eliminate the time and expense of "contouring". Brushes are replacing cloth buffs in many applications, particularly in automatic installations, with appreciable saving in operating costs.

ARCH B. TRIPLER, JR., *Second V.-Pres.*

DAYTON BRANCH

The Dayton Branch extends a unanimous vote of thanks to the personnel and management of two nearby plants which proved most cordial hosts during the first month of the year.

On January 9 the regular meeting was held at the Aeroproducts Division of General Motors Corporation at Vandalia, Ohio, and attended by forty-nine members and friends. Following the presentation of a very interesting sound film, "Die Casting", furnished by New Jersey Zinc Company, a tour of the plant was made and the group observed the manufacture of aeroplane propellors and various other products.

Another plant tour was made through the Kings Mills plant of the Electric Auto-Lite Company, Lamp Division, on January 30. Fifty-seven participated in spite of the cold weather, and considerable interest was shown in the well-planned and highly modernized installation designed to electroplate zinc base die castings for exterior automotive trim at a high rate of production.

H. E. AUSTEN has been appointed chairman of the Dayton Branch Exhibits Committee. Three new members have been welcomed into membership, and three additional applications have been received.

E. W. REHME, *Secretary-Treasurer.*

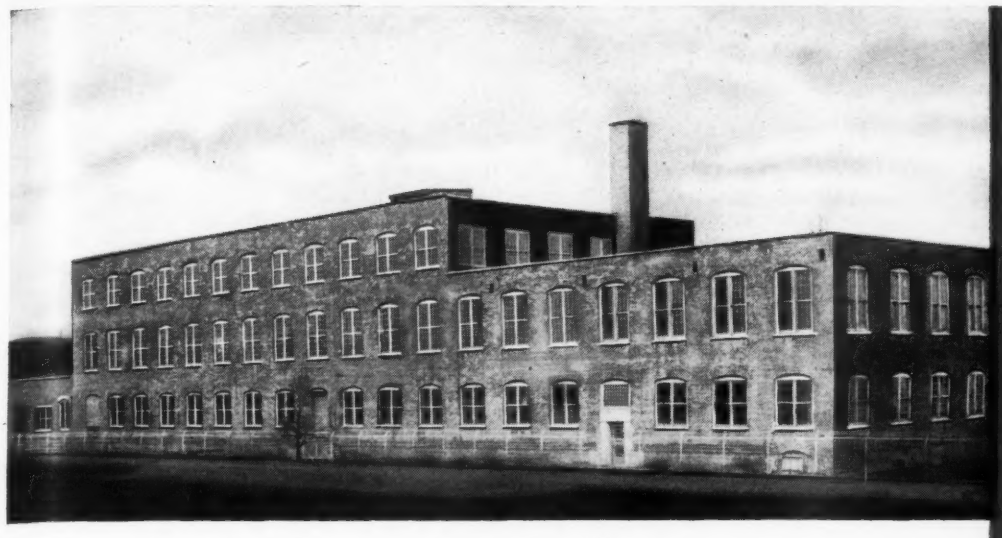
DAYTON BRANCH

The Third Annual Educational Session was held at the Miami Hotel on February 14, with A. E. S. FIRST VICE-PRESIDENT SAMUEL S. JOHNSTON presiding. A very excellent turnout was had in spite of unfavorable weather which kept many from attending and which delayed the third scheduled speaker's equipment so that his presentation could not be given.

The lectures proved most instructive and practical. MR. BERNARD C. CASE of Hanson-Van Winkle-Munning Company presented his paper on "Electrolytic Purification of Solutions", which was well supplemented with slides showing test data. The emergence in the plating industry of low current density purification of solutions was covered, and the process controls as well as the equipment requirements for this procedure were outlined. Removal rates of the various impurities in plating solutions were given.

MR. M. C. WELKER of American Cyanamid and Chemical Corporation presented a sound film and talk on "*Demineralized Water in the Plating Room.*" Many practical applications of demineralized water both in and out of the plating industry were presented, with particular emphasis on their effects on quality and production control.

The third scheduled speaker, MR. M. L. MOLL of Mine Safety Appliances Company, made arrangements to have a presentation of his topic, "The Air We



The Promat organization has devoted many years to research and development in the field of metal finishing, both protective and decorative. Our Waukegan plant, pictured above, contains extensive laboratories in which new products are developed; and a pilot plating plant in which new products are thoroughly tested on a pro duction scale before they are released.

It is the aim of all Promat products and processes to produce higher quality finishes with maximum efficiency and at the lowest costs consistent with high quality.

The Promat Division, backed by the experience and resources of Poor & Company, long established suppliers to American railways, will continue to develop and offer new and better products to the electroplater.

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Breathe", sent to all members of the Branch as well as to those visitors who expressed their interest at the session.

The banquet and entertainment earned for the Branch many favorable comments. The excellent program, which had been planned by the committee headed by Co-Chairmen Walter Moline and Bill Cryderman, assures us of a large, following for our next Annual Party.

E. W. Rehme, *Secretary-Treasurer.*

DETROIT BRANCH

Over two hundred members and guests attended the February meeting, held as usual in the Hotel Statler.

After acting on twelve applications for membership and transacting other minor business the meeting was turned over to Cleveland Nixon, Fischer Body-Ternstedt Division, G. M. C. who presided over the educational session.

We first viewed the color-sound motion picture entitled *Clean Waters*, courtesy General Electric Company, which showed the effects of pollution of streams and water sources and how it can be overcome by proper treatment methods. Mr. Nixon then introduced Mr. Clyde L. Palmer, Senior Associate Engineer, City of Detroit, who spoke on the city's attitude regarding disposal of plating room wastes. He covered the various factors that had ot be considered in the regulation of such disposal, touching on the effect of wastes upon the system, how it might affect other users of the sewage system, etc. Mr. L. A. Danse of General Motors Central Office then read reports of General Motors' activities in the field of disposal of plating room wastes, which demonstrated how important this company considers the problem and what it is doing about it. Mr. L. F. Oeming of the Michigan Stream Control Commission continued with several very pertinent remarks on the effect of various plating room wastes on stream pollution. Mr. Palmer then proceeded with a discussion of standards and regulations controlling the discharge of industrial wastes into the Detroit sewer system. He gave specific data on acidity and alkalinity, gas content, explosives, inflammable substances, greases, insoluble substances, total solids, chlorine demand, etc., and emphasized the harm caused by ferrous sulfate, which increases the chlorine demand very markedly. It was indicated that a number of plating room wastes could be satisfactorily discharged into the Detroit sewage system if the *p*H was properly controlled and there was sufficient dilution. Detroit has been quite liberal in its specifications for waste discharges.

Following this timely discussion, enjoyable refreshments were served.

R. H. Dudley, *Publicity Chairman.*

HARTFORD BRANCH

The regular monthly meeting on January 19 was attended by seventy members and friends.

The speaker of the evening, Mr. Sigmund Fabry of Belke Manufacturing Company, discussed "Design, Construction and Insulation of Plating Racks". Through the generosity of the Belke Manufacturing Company all persons attending were presented with a copy of the *Plating Rack Manual* by William E. Belke, which is gratefully acknowledged.

Movies in color and sound were shown, to the enjoyment of all, after which refreshments were served.

A. J. Dankevich, *Secretary.*

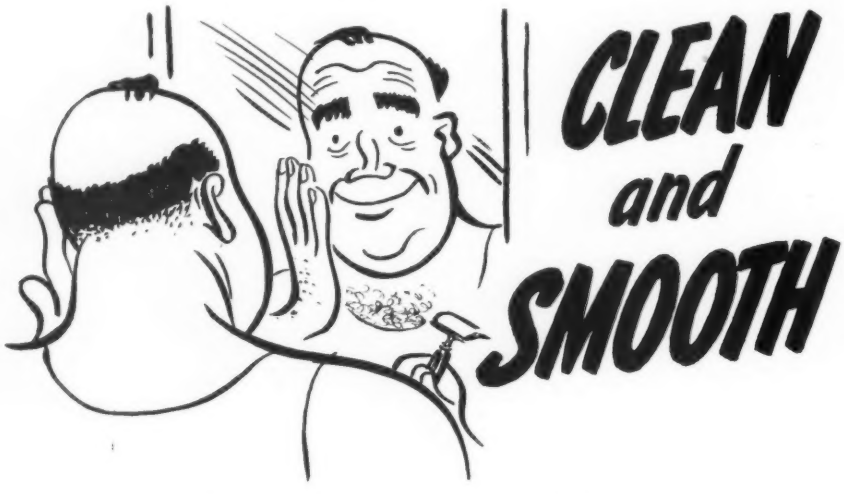
HARTFORD BRANCH

Some seventy-five members and friends attended the regular meeting on February 16. After President W. J. Cullen had called on Mr. George Hogaboom, who outlined the history of the Hartford Branch, Technical Chairman Theodore Voyda introduced Mr. Ralph McCahan, who spoke of "Trouble Shooting on Cyanide Plating Solutions". The highlight of the talk was a preview of a novel method for prevention of roughness in cyanide plating solutions. A lengthy and most interesting question period followed.

Movies with sound of the *World Serious of 1947* were shown. These movies were taken at the Hartford Branch Clambake last fall and, considering the condition of the players and the cameraman, they were good.

Refreshments were enjoyed by all at the close of the meeting.

A. J. Dankevich, *Secretary.*



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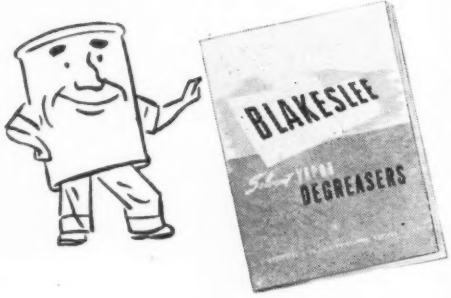

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INDIANAPOLIS BRANCH

The attendance at the meeting on February 4 was small due to treacherous driving conditions. One applicant was elected to membership. MAX MALVASE announced that tickets for the Spring Dinner-Dance were ready for distribution.

The guest speaker was MR. H. W. KENNEDY of the E. I. du Pont de Nemours & Company. He gave a very enlightening talk on "Zinc Plating" in which he emphasized the value of bright zinc and bright dipping to make parts competitive with cadmium plated parts and answered many questions by the members.

JAMES J. MONAGLE,
Secretary-Treasurer.

JACKSON–LANSING BRANCH

Approximately one hundred members and guests attended the December meeting, which was held at the Home Dairy, Flint, Mich., to bring the objects of the A. E. S. before a large Flint group.

Hanson-Van Winkle-Munning Company sponsored the meeting, and its MR. M. J. MOLL gave an excellent discourse on "Automatic Plating Equipment", with special pleading that purchasers buy machines adequate in size and process design to offer some flexibility for use when requirements change.

Very interesting films of automatic plating machines were shown.

U. J. FORSYTH,
Secretary-Treasurer.

LOS ANGELES BRANCH

Eighty persons including eleven guests attended the regular meeting on February 11 at Scully's.

CAPTAIN BAHME of the Bureau of Fire Prevention, Los Angeles Fire Department, gave a short talk on the ordinance regulating the use and storage of dangerous chemicals which had been passed after the O'Connor disaster. With actual cases, he illustrated the hazards in fighting chemical fires and explained why businesses using chemicals in quantity should give full information to the Fire Department to secure maximum protection for the property and the fire fighters.

GEORGE W. SLOMIN of the Electrochemical Engineering Laboratories in Los Angeles spoke on "Deposition of Copper", discussing valences, bath efficiencies, polarization, and limiting current densities in sulfate, fluoborate, and various cyanide baths.

The Question Box yielded the following questions:

Q. 1. How much copper will a zinc die casting absorb? *A.:* Depends on the alloy and on time and temperature.

Q. 2. In electroforming phonograph record matrices using current densities of 160–170 asf to deposit 0.030–0.040 inch of copper, can particles from the corroding anodes become electrically charged and move across to the cathode to become a source of trees? *A.:* Probably not. Treeing usually results from one or more of the following interrelated conditions: agitation too slow, maximum current density has been exceeded, or there are sharp projections on the part.

Q. 3. How do you copper plate zinc castings containing 0.2 per cent lead? *A.:* Scrap the castings.

Q. 4. How do you apply a copper-nickel-chromium plate to low-melting bismuth alloys? *A.:* It was suggested the questioner contact local trophy manufacturers.

DEAN WILLIAMS, *Secretary.*

MILWAUKEE BRANCH

MR. C. H. SAMPLE of the International Nickel Company, New York City, was the featured speaker at the 387th meeting on February 6. His subject was "Applications, Specifications and Tests for Protective Value and Performance of Electrodeposited Coatings".

One new member was elected, and there was one resignation and one in-transfer.

JAMES DURNFORD, *Secretary-Treasurer.*

MONTREAL BRANCH

Montreal Branch held its regular meeting on February 3 with twenty members and guests in attendance. MR. C. DOUGLAS gave a talk on cleaning. He began by giving a brief history of cleaning from the pounding of clothes on hard surfaces through the discovery of wood ash, the mixing of lye with fat to make soap, etc., to the present-day use of proprietary cleaners especially produced for the plater. One of the main points of the address was the stress on complete cleanliness, a condition which is seldom fully met. The advantages of each type of cleaner and the use of shields over heating coils, agitation, and temperature control were also explained.

The Librarian announced that the speaker for next meeting would be MR. R. E. GORDON of R. C. A. Victor, a member of long standing, who will speak on "Plating in the Manufacture of Records."

Two new members were elected and one application was approved.

WILLIAM GLOVER, *Secretary-Treasurer.*

NEWARK BRANCH

Two men joined the Branch and two more made application for membership at the meeting on January 16. There was one in-transfer.

Forty-five members and guests heard MR. B. S. FLUG of Bart-Messing Corporation, Brooklyn, N. Y., discuss "Bright Nickel Plating". He not only emphasized such engineering factors as tank design, heating coils, filter surface area, and anode spacing, but also dwelled on the role of impurities and their removal and the maintenance of bath constituents.

SAMUEL S. FREY, *Recording Secretary.*

NEWARK BRANCH

A gratifyingly large turnout of sixty-five people greeted MR. DANIEL GRAY when he spoke about "Electropolishing of Silver" at the meeting on February 20. Mr. Gray, who is Chief Chemist of Oneida, Limited, Oneida, N. Y., told how his company electropolished silverware by an 18-second reverse current treatment in a bath containing 32.4 g/l silver, 19.5 g/l free potassium cyanide and 41.5 g/l potassium carbonate. A 30-second treatment would be even more beneficial. The area of the silver cathodes is about twice that of the anodic work area, which prevents formation of powdery silver deposits. A lively discussion period followed. A display of silver plated spoons, some of which had been electropolished, were offered for examination after the meeting.

Two men were elected to membership and three applications were received. There were one out-transfer and one resignation.

The Branch decided to donate $25.00 to the Red Cross.

SAMUEL S. FREY, *Recording Secretary.*

NEW HAVEN BRANCH

In the absence of PRESIDENT E. W. LUTHER, VICE-PRESIDENT DR. C. FRED GURNHAM presided over the regular monthly meeting on January 15. The following committee was appointed to study the Revised Constitution: CLARENCE GARNER, FRED C. GURNHAM, H. L. KELLNER, GEORGE KNECHT, MALCOLM ORR, AL ROSENTHAL, and HENRY SMITH.

TECHNICAL CHAIRMAN MALCOLM ORR introduced the speaker, DR. RALPH A. SCHAEFER, Director of Research, Cleveland Graphite Bronze Company, Cleveland, Ohio, who spoke on "Electroplating of Lead, Tin, Silver and Their Alloys". Having discussed the development of procedures, electrolytes and equipment for the high speed plating of silver, he turned to fabrication and development of silver-plated bearings for aviation engines and to his recent work on overlay plate of binary and ternary alloys for truck, aircraft and diesel bearings. We appreciated the opportunity to hear about these notable contributions to the electroplating industry.

B. J. GAFFNEY,
Secretary-Treasurer.

NEW YORK BRANCH

A testimonial dinner was tendered MR. HENRY LEVINE on February 14. Because of the ill health of the Guest of Honor, the affair took place at his home, which, of course, restricted the number attending.

Mr. Levine has been an active member of the Branch for over twenty-five years. His offices include those of Librarian and Vice-President, and his service on the committee for the 1939 Jubilee Convention in New York greatly contributed to

its success. At the time when the importance of analytical control of plating solutions was first realized Mr. Levine organized a school for the training of platers in analysis and control of solutions. Not a few "old-timers" credit Mr. Levine and his school with rescuing them from oblivion.

Mr. Levine is the inventor of the Levine Bright Nickel Solution, distributed by the Enequist Chemical Company of Brooklyn, N. Y., and so widely used in the East. He is also recognized as one of the foremost metal finishing onsultants in the North-Eastern area.

MR. GEORGE SCHORE, President of the New York Branch of the A. E. S., introduced many of Mr. Levine's close associates in the industry.

Of the many speakers of the evening, MR. MAX GELFMAN, co-partner in Krischner Metal Products, outshone them all. With his "mad Russian" dialect and his Milton Berle wit, he described his first meetings with the Guest of Honor. Max was having trouble at the time: "I am putting in nickel and am pulling out brass from my chrome solution," he told Mr. Levine, who answered, "That's nothing, Max. That's nothing", and then proceeded to help him.

Many owe much to Mr. Levine's knowledge and experience and to his timely and unselfish assistance. His ear has never been deaf to the cry of a plater in need.

ALBERT G. FUSCO,
Recording Secretary.

PROVIDENCE–ATTLEBORO BRANCH

MR. A. S. KOHLER of Frederick Gumm Chemical Company discussed "Deburring and Barrel Finishing" at the regular meeting on February 16 before sixty members and guests. The speaker emphasized that size and weight of the parts being finished as well as their tendency to nest are limiting factors. The cost of operation must be compared to that of hand finishing. Various types of barrels were compared, as were the effects produced by various abrasives and other tumbling media, speed of tumbling, and time of treatment.

A lengthy, very spirited period of questions and answers brought the meeting to a close.

EDWARD A. PARKER,
Secretary-Treasurer.

ST. JOSEPH VALLEY BRANCH

The February meeting was held on the fourth in the Empire Room of the Hotel Elkhart. Thirty-six members and guests attended the dinner, and forty-six were present at the business and technical session.

One new member was elected, and one new application received. A nominating committee consisting of K. HARLAN, Chairman, R. D. WYSONG, LOUIS RAQUE, and JAMES HEDGES was appointed by PRESIDENT MCDOWELL.

Following an introduction by LIBRARIAN PETERSON, MR. MAURICE CALDWELL, Assistant Vice-President of the Jarvis Division of the Doehler-Jarvis Corporation, Grand Rapids, Mich., spoke on "Recent Developments in the Finishing of Zinc Base Alloy Die Castings". His excellent talk, which was a preview of the paper published in the February issue of PLATING, was supplemented with slides.

The prolonged question period which followed was a good indication of the interest aroused.

HAROLD J. WIESNER,
Secretary-Treasurer.

SAN FRANCISCO BRANCH

Sixteen members and one guest attended the regular meeting on February 12.

One applicant , who had been approved by Board of Managers, was elected to membership. J. R. PATTENGER, Chairman of the New Constitution Committee, reported on the new proposed revision and recommended that it be approved. It was so voted by the membership.

It was decided to read and discuss leading articles from PLATING and *Metal Finishing* when no suitable speaker is available.

JACK HITE, *Secretary-Treasurer.*

SOUTHEASTERN BRANCH

The regular monthly meeting was held on February 12 in the Robert Fulton Hotel with eighteen members present.

LOUIS ROSENBURG of Simmons Plating Works was appointed chairman of the Branch Exhibits Committee and will pick his own committee members.

The greater part of the evening was spent in a general "bull" session.

WILLIAM T. WEYMOUTH,
Secretary-Treasurer.

SPRINGFIELD BRANCH

The meeting on February 23 was devoted to a Round Table Discussion. JACK COSTIGAN introduced the members of the panel, MR. GEORGE B. HOGABOOM, MR. ARTHUR W. LOGOZZO, DR. WALTER R. MEYER and MR. RALPH MCCAHAN, and presided over the proceedings. All kinds of interesting questions were asked and very ably answered. Mr. Hogaboom gave a short history of the Branch.

LAURENCE R. FOUNTAIN,
Secretary-Treasurer.

SYDNEY BRANCH

The two main items of business at the meeting on February 10 were the amendments to the Constitution and the difficulty that the Branch is meeting with in receiving publications. The members were of the opinion that the increased dues would adversely affect the membership of the Australian Branches, as the cost of living has not risen here to the same extent that it has in the U. S. A. and a rise of 33 per cent in the dues would constitute an appreciable amount.

The secretary reported on the activities of the Branch during 1947 and disclosed that it had been one of its best years since its formation in 1944. The culm was reached at the Annual Social held in place of the December meeting. Over eighty members and their friends attended this very successful affair.

An appeal for donations for the Food for Britain Fund resulted in £7–7–0 being collected, building the fund up to £33–12–0. Parcels have been sent to members of the Electrodepositors' Society in England, and it is hoped eventually to send one to every member.

Five new members were elected.

After the business session PRESIDENT E. J. WRIGHT delivered an address and then gave an interesting talk on "Nickel Plating". The attendance was twenty-six.

J. R. GODFREY, *Secretary.*

TOLEDO BRANCH

The regular monthly meeting on February 5 in the Commodore Perry Hotel was attended by thirty members and six guests.

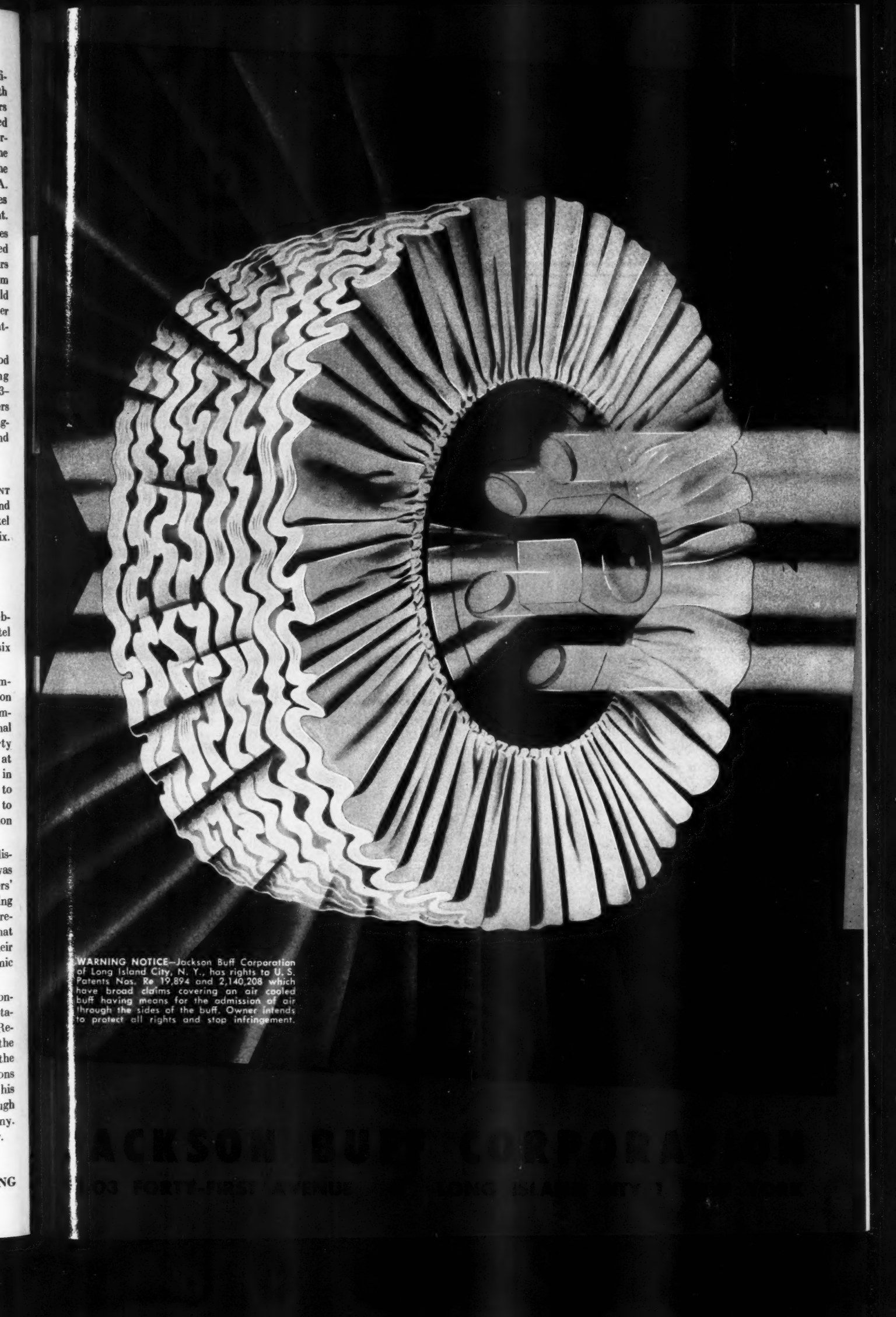
The action of the Constitution Committee in approving the new Constitution was affirmed. One application for membership was accepted. The Educational Committee reported that a total of thirty members and others had enrolled at Toledo University to take the course in electroplating. The Branch voted to donate 60 feet ¼ x 1 inch bus bar to Toledo University for use in connection with the plating course.

The chromic acid shortage was discussed for about fifteen minutes. It was felt that the American Electroplaters' Society should find out what is causing the shortage and take some action to relieve the situation; it was reported that some plants have had to shut down their chromium lines due to lack of chromic acid.

DR. D. G. FOULKE of the Hanson-Van Winkle-Munning Company, Matawan, N. J., then described "Periodic Reverse Current Electroplating". That the topic was interesting was shown by the fact the speaker had to answer questions for almost an hour after the close of his talk. Refreshments were served through the courtesy of the Vic Miner Company.

G. BERGEMAN, *Secretary.*

(*Continued on page 403*)



WARNING NOTICE—Jackson Buff Corporation of Long Island City, N. Y., has rights to U. S. Patents Nos. Re 19,894 and 2,140,208 which have broad claims covering an air cooled buff having means for the admission of air through the sides of the buff. Owner intends to protect all rights and stop infringement.

JACKSON BUFF CORPORATION

503 FORTY-FIRST AVENUE, LONG ISLAND CITY

New Proposed A.E.S. Constitution and By-Laws

The following proposed Constitution and By-Laws for the American Electroplaters' Society has been prepared by the Constitution Revision Committee composed of A. W. Logozzo, Hartford Branch, Chairman; F. J. MacStoker, New York Branch; F. R. Keller, Pittsburgh Branch; C. F. Nixon, Detroit Branch; and C. Kelly, Chicago Branch. It incorporates the opinions expressed by the Branches through their own committees and has been approved by the Law Committee as to wording and classification.

CONSTITUTION

PREAMBLE

NAME, OBJECT, AND DIVISIONS

This society shall be known as American Electroplaters' Society, Incorporated, hereinafter called the Society. It shall be incorporated under the laws of the State of New Jersey.

The object of the Society shall be the improvement and dissemination of the knowledge of the arts and sciences of electrodeposition and of finishing of metals and of allied arts, the development of a cooperative spirit of friendship and mutual assistance among its members.

The Society shall consist of members duly elected to membership under the Constitution and By-Laws. There shall be branch or local societies, hereinafter called Branches, duly organized under the Constitution and By-Laws as integral parts of the Society. The Branches shall consist of members of the Society who have become members of the Branches of their choice through the procedures established by the said Branches under the provisions of this Constitution.

There shall be a governing body called the Supreme Society, consisting of delegates duly elected by the several Branches.

There shall be an Executive Board, duly elected by the Supreme Society in accordance with the Constitution and By-Laws.

PART I. THE SOCIETY

Article I. Functions

Section 1. Organization: The Supreme Society shall consist of three Active Members in good standing from each Branch in good standing, hereinafter called Delegates, whose credentials have been duly accepted in Annual Meeting. An elected officer of the Society shall automatically be one of the three Delegates from his Branch. A quorum for the transaction of the business of the Supreme Society shall be two-thirds of the Delegates, present in person or by proxy.

The Executive Board shall consist of the President, the Past President, the First Vice-President, the Second Vice-President, and the Third Vice-President. A quorum for the transaction of the business of the Executive Board shall be four of the above-named officers.

Section 2. Authority: The Supreme Society shall be the governing body of the Society, and all Branches shall be subject to the laws by it enacted. Its decisions shall be final.

The Executive Board shall be the administrative body of the Supreme Society. It shall conduct the ordinary business of the Society under the provisions of the Constitution and By-Laws and the rulings of the Supreme Society. Its decisions shall be subject to review by the Supreme Society.

Article II. Membership

Section 1. Members: Any person interested in the object of the Society may become a member.

Section 2. Classes of Membership: The Society shall consist of Active Members, Student Members, Sustaining Members, and Honorary Members.

Section 3. Active Members: Any person interested in the object of the Society may be elected an Active Member.

Section 4. Student Members: Any person not over twenty-five years of age, regularly enrolled in full-time courses at any accredited university or other institution of learning and interested in the object of the Society may be elected a Student Member.

Section 5. Honorary Members: Honorary Membership may be conferred by majority vote of the Supreme Society in Annual Meeting upon any person whose knowledge and outstanding service have enhanced the welfare of the Society. A Branch desirous of having any person elected Honorary Member shall nominate that person, with appropriate information in support of his eligibility, to the Executive Board. If a majority of the Executive Board approve the nomination, it shall be presented for vote to the Supreme Society at the next Annual Meeting.

Section 6. Sustaining Members: Any firm or person interested in the electroplating and metal-finishing industry or in the object of the Society may be elected a Sustaining Member by majority vote of the Executive Board.

An Active Member may also be a Sustaining Member.

Section 7. Privileges: Student Members and Sustaining Members shall have all rights of membership except those of voting and holding office. Members not belonging to Branches shall have all rights of membership except holding office or election as Delegates.

Section 8. Branch Membership: Application for membership in a Branch shall be made by the candidate for admission to the Branch Secretary on the official form accompanied by the application fee. The Branch Secretary shall submit the application to the Board of Managers or other established body of the Branch, which shall investigate the references of the candidate and approve or disapprove the application by majority vote. An approved application shall at the next regular meeting of the Branch be submitted to the Branch for action. The Branch Secretary shall immediately notify the Executive Secretary of the election of any new member.

Section 9. Membership-at-Large: A candidate for membership not desiring membership in any Branch may become a Member-at-Large. Application for Membership-at-Large in the Society shall be made to the Executive Secretary on the official form accompanied by the application fee. The Executive Secretary shall submit the application to the Executive Board, which shall investigate the references of the candidate and shall within thirty days of receipt of application admit or reject the candidate by majority vote.

Section 10. Obligation: Each applicant for membership shall receive a copy of the Constitution and By-Laws and shall read and accept same. He shall not be permitted to plead ignorance in extenuation of any violation of their provisions.

Section 11. Transfer: A member in good standing may transfer from one Branch to another Branch, from Membership-at-Large to membership in a Branch, or from membership in a Branch to Membership-at-Large with the consent of the governing bodies involved and through such procedure of transfer as may be established by the Executive Board of the Society.

Section 12. Resignation: A member shall be permitted to resign from the Society only when his dues shall have been paid in full to date of resignation.

Section 13. Expulsion: A member having made false or misleading statements in applying for membership or having acted in violation of the Constitution may be expelled from the Society by the Branch, or in the case of a Member-at-Large by the Executive Board, and all monies received from him shall be forfeited by him. However, before acting upon any measure of expulsion, the Branch or the Executive Board, as the case may be, shall provide the alleged offender with full and due opportunity to defend himself in open hearing against the charges brought against him.

Section 14. Reinstatement: Any former member of the Society who may wish to be reinstated shall be considered a new candidate for membership.

ARTICLE III. DUTIES OF MEMBERS

Section 1. Voting: Delegates may vote in person or by proxy at the Annual Meeting of the Supreme Society. The Branch delegation of which a presiding officer is a member may replace him with an Alternate on the floor of a meeting. The presiding officer at a meeting of the Supreme Society may cast a deciding vote in case of tie.

Section 2. Proxies: A Delegate or Delegates may exercise the proxy of any Delegate elected by the Branch, and the Delegates of any Branch may represent not more than one other Branch by proxies duly presented to the Credentials Committee and accepted by the Supreme Society.

ARTICLE IV. OFFICERS

Section 1. Roster: The Officers of the Society shall be Past President, President, First Vice-President, Second Vice-President, Third Vice-President, Executive Secretary, and Residing Legal Officer. A member residing in New Jersey shall be Residing Legal Officer of the Society in the State of New Jersey. The Executive Secretary and Residing Legal Officer shall be appointed by the Executive Board, and each shall serve until his successor shall have been appointed and installed. All other Officers of the Society shall be elected.

Section 2. Qualifications: Each Officer of the Society shall be an Active Member of the Society in good standing. Each elected Officer shall further be a Delegate. The President of the Society shall before election have served at least one term on the Executive Board.

Section 3. Term: The term of an elected Officer shall be for one year or until his successor shall have been elected or appointed and installed. No person shall hold the same elective office more than two terms in succession.

Section 4. Vacancy: In the event of a vacancy in the office of President, the Vice-President highest in rank shall succeed.

Section 5. Past President: The retiring President shall become the Past President of the Society.

ARTICLE V. FINANCES

Section 1. Application Fees: The minimum application fee shall be five dollars. Application fee shall be submitted with each application for membership and paid to the Branch, or in case of application for Membership-at-Large to the Supreme Society.

Section 2. Annual Dues: (a) The minimum annual dues of Active Members shall be eight dollars. (b) The minimum annual dues of Student Members shall be five dollars. (c) The minimum annual dues of Sustaining Members shall be one hundred dollars and shall be paid to the Executive Secretary. (d) The dues of Members-at-Large shall be paid to the Executive Secretary.

Section 3. Per Capita Tax: From the annual dues of each Active, Student, and Sustaining Member there shall be paid to the Supreme Society a Per Capita Tax of four dollars and seventy cents ($4.70), part of which shall be used to pay the annual subscription to the official journal of the Society at one-half of the regular subscription price.

Section 4. Fiscal Year. The fiscal year of the Society shall commence on the first day of April. All financial reports shall be made from and all transactions closed to conform with the end of the fiscal year on the thirty-first day of March.

ARTICLE VI. MEETINGS

Section 1. Annual Meeting: The Annual Meeting for the transaction of business of the Supreme Society shall take place during the Annual Convention. The Annual Meeting and Convention shall be held between June 1 and September 30 unless otherwise agreed between the Executive Board and the Branch designated to entertain the Convention, hereinafter called the Host Branch. In national emergency the Executive Board may suspend the Annual Meeting and conduct the affairs of the Society and Supreme Society by letter ballot.

Section 2. Special Meetings: A Special Meeting shall be called by the President, with the approval of the Executive Board, upon the written application of a majority of the Branches. The purpose of such Special Meeting shall be stated in writing in the application and the Executive Secretary shall send a copy of the said statement to each Delegate. No business not included in the said statement shall be transacted at any Special Meeting, nor shall a Special Meeting be called to consider any matter that can be decided by law or by the Executive Board under this Constitution and By-Laws.

ARTICLE VII. CHARTERS

Section 1. Granting and Voiding: The Executive Board may grant Temporary or Permanent Charters to Branches duly organized under the Constitution and By-Laws. The Executive Board may at its discretion revoke any Temporary Charter. The Supreme Society may on the recommendation of the Executive Board or upon presentation of evidence revoke for cause the Permanent Charter of a Branch.

Section 2. Temporary Charters: A Temporary Charter may be granted to any group, provided that:

It shall have a membership of not less than ten persons eligible for Active Membership in the Society. Any of these persons may be members of an existing Branch.

Each applicant not already a member of the Society shall make application for Active Membership to the Executive Secretary as provided in this Constitution, and applicants already members shall submit evidence of good standing. The requisite number shall be acceptable to the Executive Board.

The applicants shall petition in writing for a Charter, and each applicant shall over his signature pledge loyal support to the Society and obedience to its Constitution and By-Laws.

Section 3. Duration of Temporary Charter: A Temporary Charter shall be in force until a Permanent Charter is granted or until it is revoked by the Executive Board. The Executive Board shall revoke any Temporary Charter if application for a Permanent Charter be not made within one year of issue of the Temporary Charter.

Section 4. Permanent Charter: The Executive Board shall grant a Permanent Charter upon written application to any Branch that has operated for three or more months under a Temporary Charter.

Section 5. Branch Franchise: Charters shall not be granted to more than one Branch in any city.

ARTICLE VIII. OFFICIAL PUBLICATIONS

Section 1. Official Journal: The Society shall publish periodically an official journal which shall contain articles pertaining to the object of the Society, changes in membership, news of the organization and its members and of the industry in general, and other matters of value to the membership. Each member of the Society in good standing shall receive a copy of the official journal for one-half the regular subscription price, paid to the Society out of his annual dues. Non-members shall be offered subscription at the regular price.

Section 2. Proceedings: Each member in good standing shall receive a copy of the technical proceedings of the Annual Convention.

Section 3. Minutes of Annual Meetings: One copy of the minutes of the Annual Meeting shall be sent to each Branch Secretary and to each elected Officer of the Society.

Section 4. Release of Papers: Papers presented before a Branch shall be the property of the authors. With the consent of the authors, a Branch may offer such papers for publication in the official journal of the Society.

PART II. BRANCHES

ARTICLE I

Section 1. Names: A Branch shall be known as ———— Branch of the American Electroplaters' Society, the blank in this name being the name of the city or locality of the Branch.

Section 2. Organization: Branches shall elect their own officers and may operate under any rules or laws of their own

choosing not inconsistent with the Constitution and By-Laws of the Society. Any special laws or rules of a Branch shall be filed with the Executive Secretary.

Section 3. Finances: A Branch may receive donations or bequests and may expend or invest the same at its own discretion. A Branch may levy assessments and otherwise raise or collect funds for its own purposes and shall have the entire use and management of such funds.

PART III. REVISION OF CONSTITUTION

Article I

Section 1. Authority: This Constitution or any part thereof may be repealed, altered, annulled, or otherwise amended by a two-thirds vote of all Delegates, either at an Annual Meeting or by letter ballot, after regular procedure of initiative and notice as provided in Sections 2 and 3 of this Article.

Section 2. Initiative: Due notice shall be given and a vote shall be taken on any revision submitted by four or more Branches and approved by the Executive Board.

Section 3. Notice: On receipt of a revision duly submitted, the Executive Board shall immediately cause such revision to be reviewed by the authority constituted for that purpose, properly worded and classified, and published in the official journal of the Society at the first opportunity and in any case not later than three months from receipt of the said revision. Vote of the Delegates on the revision shall be taken within three months of its publication in the official journal.

BY-LAWS

PART I. THE SOCIETY

Article I. Election of Officers

Section 1. Time and Method: The Officers of the Society shall be elected during the Annual Meeting by roll call of the Delegates after nomination and second from the floor. A Delegate nominating any candidate for office in the absence from the floor of the said candidate shall vouch for the willingness of the said candidate to serve if elected.

Section 2. Majority Vote: A candidate receiving a majority of votes cast shall be declared elected In case of no majority on a first roll call, the candidate receiving the fewest votes shall be dropped from consideration and another vote taken; and this procedure shall be repeated until a majority vote shall have been cast for one candidate.

Section 3. Installation: Installation of Officers shall take place immediately after their election.

Article II. Duties of Officers

Section 1. Reports: Each Officer of the Society shall make a report of his activities to the Annual Convention.

Section 2. President: It shall be the duty of the President to preside over all meetings of the Society, to preserve order, to put all proper motions before the meeting if duly seconded, to decide all questions of order subject to appeal to the meeting, and to cast the deciding vote in case of tie. He shall be Chairman of the Executive Board. In honor of his office he shall be a member of all committees. He shall call all Special Meetings of the Society and all meetings of the Executive Board. He shall appoint all committees not otherwise provided for. When an Officer resigns or dies he shall, with the approval of the Executive Board, appoint a qualified member of the Society to fill the vacancy for the unexpired term.

Section 3. First Vice-President: The First Vice-President shall perform the duties of President in case of death, resignation, or absence of the President. He shall be Chairman of the Educational Committee and shall perform such other duties as may be assigned him by the President or the Executive Board.

Section 4. Second Vice-President: The Second Vice-President shall perform the duties of President in the absence of the President and First Vice-President. He shall be Chairman of the Membership Committee and shall perform such other duties as may be assigned him by the President or the Executive Board.

Section 5. Third Vice-President: The Third Vice-President shall perform the duties of President in the absence of the President and First and Second Vice-Presidents and such other duties as may be assigned him by the President or the Executive Board.

Section 6. Executive Board: The Executive Board shall meet at the call of the President at intervals of not more than four months. It shall conduct promptly and diligently the ordinary business of the Society. It shall review nominations for Honorary Membership and be responsible for the election of Sustaining Members and the election and expulsion of Members-at-Large. It shall grant all charters and may revoke Temporary Charters. . It shall prepare the Budget and faithfully oversee the finances of the Society, and shall be responsible for audit of the accounts of the Society by a public accountant for report to the Annual Meeting and at any other times it may deem necessary. It shall oversee disbursement of all special funds. It shall appoint the Executive Secretary and the Residing Legal Officer and shall have authority over their duties. With the Host Branch, it shall select the date for the Annual Meeting and Convention, and it shall approve plans for these before their execution. It shall receive and transmit proposals for amendment of the Constitution and By-Laws. It shall approve any call for a Special Meeting of the Supreme Society. It shall furnish to the Branches the Society Emblem and necessary standard forms on such terms as may be determined by the Supreme Society. It shall carry out such other business as may be referred to it by the President or the Society. In national emergency, it may at its discretion suspend the Annual Meeting and conduct the business of the Supreme Society by letter ballot.

Section 7. Executive Secretary: The Executive Secretary shall be the business officer of the Executive Board and shall be responsible to the board. He shall conduct the correspondence of the Society with the Branches promptly and diligently and shall maintain an accurate record of the membership of the Society with a view to efficient promotion of the object of the Society. He shall keep accurate record of the proceedings of the Supreme Society and of the Executive Board. He shall receive all funds of the Society, shall deposit said funds as directed by the Executive Board, and shall pay with the approval of the President all bills promptly presented to him for payment from the General and Special Funds and shall make disbursements from the Research Fund with the approval of the Research Committee. He shall receive and give receipt for all funds paid to the Society by the Branches. He shall keep such books of account as the Executive Board shall direct. He shall be Chairman of the Employment Committee. He shall preserve for ready access all papers and documents pertaining to his office. He shall be Managing Editor of the official journal; as such he shall appoint the members of the editorial board and editorial staff, see to the editing and publication of such matter as the Society shall direct and to the copyright of appropriate publications of the Society, and preserve for ready access all valuable papers submitted by members and Branches. He may arrange exchange of publications with other appropriate journals and institutions. He may release papers presented at the Annual Meeting for publication outside the Society, with proper credit and may at his discretion release papers not published by the Society. He shall have charge of advertising in the official journal. He shall distribute the official journal to the members of the Society. His salary shall be fixed by the Executive Board, subject to approval by the Supreme Society. He shall furnish the bonds required by the Executive Board. He shall be a member *ex-officio* of the Convention Committee and shall arrange for audit of the accounts of all Conventions. He shall be responsible for all matters pertaining to the publication of the Annual Convention program. He shall be Secretary of the Research Committee.

Section 8. Residing Legal Officer: The Residing Legal Officer shall establish the legal residence of the Society as required by the Laws of the State of New Jersey. He shall carry out such duties pertaining to his office as may be assigned him by the Executive Board.

ARTICLE III. COMMITTEES

Section 1. Appointment: As soon as feasible after his election the President shall appoint all necessary committees not otherwise provided for. Unless otherwise specified, all members of these committees shall be Active Members of the Society.

Section 2. Credentials Committee: The Credentials Committee shall meet in preparation for the Annual Meeting at the call of the President to consider all credentials and proxies of Delegates and shall promptly present its findings for action by the Annual Meeting.

Section 3. Law Committee: The Law Committee shall receive all proposed amendments to the Constitution and shall see to it that said amendments are properly worded and classified for immediate publication in the official journal. It may at its discretion consult with the proponents of said amendments for clarification of language and meaning, and in no case shall it so modify an amendment as to alter the intent of said proponents.

Section 4. Budget Committee: The Executive Board shall be the Budget Committee. It shall submit to the Annual Meeting of the Society a budget of estimated receipts and expenditures for the current fiscal year. After this or an amended budget has been approved by the Supreme Society, and unless a proportional increase in income has been realized, expenditures shall not be increased by more than 20 per cent without the approval by letter ballot of a majority of the Supreme Society. If the receipts shall be found less than estimated in relation to expenditures, the Executive Board shall endeavor to decrease expenditures accordingly.

Section 5. Research Committee: The Research Committee shall consist of nine members of the Society and the Executive Secretary. A representative of any technical organization designated by the Executive Board may be invited to participate in an advisory capacity in the work of the Committee. Of the nine members of the Society, three shall be appointed each year by the Executive Board, and the term of each such member shall be three years or until his successor has been appointed and installed. No member shall be appointed to the Committee for more than two consecutive terms. Upon its annual organization, the Committee shall select its Chairman and designate a Sub-Committee on Disbursements. The Executive Secretary shall be Secretary of the Committee.

The Research Committee shall be authorized to solicit funds for research from any source. Such funds and such other monies as are herein so allocated shall be held in the Research Fund by the Executive Secretary and disbursed by him with the approval of the Committee.

The Research Committee shall cooperate with the Executive Board on its general plans for the ensuing year, including those for such cooperation with other societies and institutions as it deems expedient. Upon approval of a plan by the Executive Board, it may carry out the said plan, employing personnel and publishing and distributing results in cooperation with the Executive Secretary.

The Chairman shall call a meeting of the Committee during the Annual Convention and at least one other time during the fiscal year at a place convenient to the membership of the Committee. Reports of the work of the Research Committee shall be made to the Annual Meeting of the Society and as far as feasible to Branch and Regional meetings.

Section 6. Membership Committee: The Second Vice-President of the Society shall be Chairman of the Membership Committee, which shall consist of a member of each Branch. The Committee shall take appropriate measures to retain and increase the membership of the Branches. An award shall be presented annually to that Branch in each contest group making the largest per cent of gain in membership. Such award shall be purchased by the Society and shall remain the property of the Branch.

Section 7. Educational Committee: The First Vice-President of the Society shall be Chairman of the Educational Committee, which shall consist of the Librarian or other member of each Branch. This Committee shall assist Branches to improve their educational sessions by securing speakers and programs and cooperating in the organization of classes.

The Executive Secretary in his capacity of Managing Editor of the official journal shall appoint an Editorial Board, of which he shall be Chairman. This Board shall procure technical and scientific articles and abstracts for the official journal and papers for the technical and scientific sessions at the Annual Convention.

Section 8. Committee on Paper Awards: A Committee on Paper Awards shall be appointed and shall operate under the rules for the Committee appended to these By-Laws. The said rules may be amended and modified from time to time, as circumstances require, by the Committee with the approval of the Executive Board. No member of the Committee shall be eligible for award.

Section 9. Employment Committee: The Employment Committee shall consist of the Secretaries of all Branches. The Executive Secretary shall be Chairman. The Committee shall assist employers to secure qualified members of the Society for positions in the industry and shall assist unemployed members to secure employment.

Section 10. Public Relations Committee: Under the supervision of the Executive Board, the Public Relations Committee shall secure for the Society all possible publicity tending to promote the object of the Society.

ARTICLE V. FUNDS

Section 1. General Fund: All income of the Society other than hereinafter specified shall be held in the General Fund.

Section 2. Special Funds: All monies collected for special purposes shall be held by the Executive Secretary in separate accounts. Such monies shall not be expended except for the specified purposes unless by majority vote of the Supreme Society.

Section 3. Besearch Fund: All income received from Sustaining Memberships, after deduction of Per Capita Tax, and all other monies specifically designated for research shall be held by the Executive Secretary in the Research Fund and shall be expended only under direction of the Research Committee.

ARTICLE VI. DUES

Section 1. Collection: Dues shall be paid in advance for the fiscal year and are payable on the first of April. Dues are payable annually in one installment, except that a member elected during the fiscal year shall pay only for the quarter during which he is elected and for the remaining quarters of the year.

Members of Branches shall pay dues to the Branches. The Executive Secretary shall be responsible for collection of dues from Members-at-Large and Sustaining Members.

Section 2. Suspensions: Members whose Per Capita Taxes are not paid on September 1 for the fiscal year beginning April 1 of the same calendar year shall be considered suspended until said dues are paid and shall not receive the official journal or other publications of the Society during suspension.

Section 3: Per Capita Tax: A Per Capita Tax of $4.70 per annum for each member in good standing shall be paid by each Branch out of the members'dues to defray the expenses of the Society. The tax shall be paid annually, not later than the first day of September; except that a tax proportionate to the number of quarters remaining of the fiscal year shall be paid for each new member of a Branch upon his election. If a Branch tax remain unpaid after thirty days from due date, the Executive Secretary shall demand payment in writing, and if the tax remain unpaid after the thirty days following such demand, the Branch shall be considered not in good standing and its members shall not receive any benefits or publications of the Society until the said tax is paid. A Branch whose tax

for any fiscal year shall remain unpaid thirty days after the beginning of the following fiscal year may by action of the Executive Board be suspended, and persistent failure to pay shall be grounds for revoking a Branch Charter by the Supreme Society.

Section 5. Special Per Capita Tax: The Supreme Society may by two-thirds vote of all Delegates assess a Special Per Capita Tax upon the Society; but the total of such Special Per Capita Taxes shall not in any fiscal year exceed 10 per cent of the established minimum dues.

Article VII. Meetings and Conventions

Section 1. Place: The Annual Convention shall be held at a place selected by the Delegates at a previous Annual Meeting. Invitations from Branches shall be announced at the Annual Meeting. When two or more Branches present invitations, selection shall be by roll call vote. In the event of no invitation, or if for valid reason the place must be changed, the Executive Board shall select a suitable place with the consent and cooperation of a Branch or Branches.

Section 2. Order of Business: The Regular Order of Business of the Annual Meeting shall be that published in the Appendix to these By-Laws, and shall not be suspended except by unanimous consent or two-thirds vote of the Delegates present and voting.

Section 3. Alternates: The proxy of any Delegate may be exercised on the floor of a meeting by any duly accredited Delegate of his Branch.

Section 4. Privilege of the Floor: The President or presiding officer, by unanimous consent, may grant the floor of an Annual Meeting to any person.

Section 5. Parliamentary Authority: Roberts' Rules of Order shall be the parliamentary authority of the Society in all matters not especially covered in the Constitution and By-Laws or in special enactments of the Society.

Section 6. Convention Committee: The Convention Committee shall consist of members of the Host Branch and the Executive Secretary. It shall conduct the business of the Convention. At least four months before the Convention it shall submit to the Executive Board for approval a plan for the Convention, including any proposed exhibits. The Registration Fee of the Convention shall be determined by the Host Branch with the approval of the Executive Board.

Section 7. Finance: The Executive Secretary shall arrange for audit of all accounts and approve all financial arrangements. The Society shall be financially responsible for any deficit. All monies collected in connection with the Convention, by any means whatsoever, shall be available to defray the expenses of the Convention and associated enterprises. Any profit accruing after payment of all expenses shall be divided 50 per cent, but not more than $1,000 to the Host Branch and the remainder to the Society. Final audit shall be mandatory within ninety days after the Convention, and all sums due the Society shall be paid within that time.

Section 8. Exhibits: Exhibits of manufacturers' products may be held at the discretion and under the direction of the Executive Board.

PART II. BRANCHES

Article I. Authority

A Branch shall operate in accordance with its Charter and with this Constitution and By-Laws. Within the provisions of the said Charter, Constitution, and By-Laws, a Branch shall conduct its own business as it sees fit under such By-Laws as it may establish. Provisions of the By-Laws of the Society relating wholly to the internal affairs of the Branches shall be advisory and not binding.

Each Branch shall file with the Executive Secretary copies of its By-Laws and of any amendments thereto.

Article II. Meetings

Section 1. Time and Place: The Branch shall hold regular meetings on stated days at a time and place approved by a majority of the members.

Section 2. Object: The Regular Meetings shall provide for the presentation and discussion of papers on electroplating or allied subjects and for the transaction of any business that may be brought before the meeting in furtherance of the object of the Society.

Section 3. Special and Regional Meetings: A Branch may hold special meetings and join in regional meetings under the provisions of its own rules.

Article III. Duties of Branches

Section 1. Membership Applications: The Branch shall keep a record of the names of all applicants for membership. It shall establish a Board of Managers or other board which shall review the record of each applicant and approve or disapprove his election.

Section 2. Branch Supplies: The Branch shall use standard forms of application blank, membership card, certificate, Constitution of the Society, and such other matter as may be designated by the Executive Board.

Section 3. Reports: Within seven days of each meeting the Branch shall forward to the Executive Secretary a report of the meeting and copies of all appropriate papers offered for publication by the Society.

Section 4. Fiscal Year: The fiscal year of the Branch shall commence on the first day of April. All financial reports shall be made from and all transactions closed to conform with the end of the fiscal year on the thirty-first day of March.

Article IV. Organization

Section 1. Officers: The Officers of a Branch shall be President, First Vice-President, Second Vice-President, Secretary, Treasurer (or Secretary-Treasurer), Librarian, and the three or more members of the Board of Managers.

Section 2. Qualifications: Any member of a Branch who is in good standing may be elected an officer.

Section 3. Election and Term: Officers shall be elected by such procedure as the Branch may establish and shall hold office for one year, or until their successors have been elected and installed.

Article V. Duties of Officers

Section 1. President: The Branch President shall preside at all meetings, preserve order, put all proper motions before the meeting if duly seconded, and decide all questions of order subject to appeal to the meeting. He may cast the deciding vote in case of tie. He shall in honor of his office be a member of all committees. He shall appoint all committees not otherwise provided for. In the absence of any officer he shall appoint a member to act in his place. He shall call all necessary meetings of the Board of Managers.

Section 2. First Vice-President: The First Vice-President shall perform the duties of the President in the event of absence, death, or resignation of the President. He shall have charge of promoting the growth of the membership of the Branch and shall perform such other duties as may be properly assigned him.

Section 3. Second Vice-President: The Second Vice-President shall perform the duties of the First Vice-President in the event of absence, death, or resignation of the First Vice-President. He shall perform such other duties as may be properly assigned him.

Section 4. Secretary: The Secretary shall keep accurate record of all meetings of the Branch and within seven days of each meeting shall forward to the Executive Secretary a record of the meeting and copies of all appropriate papers offered for publication by the Society. He shall receive, record, and transmit for review to the Board of Managers the applications of prospective members. He shall by April 15 file with the Executive Secretary a correct list of Branch members in good standing on March 31 and shall notify the Executive Secretary monthly of any changes and additions. He shall be a member of the Employment Committee of the Society. He shall conduct the correspondence of the Branch. He shall maintain a supply of standard forms of the Society and shall furnish to each elected member a copy of the Constitution and By-Laws. He shall keep itemized account of the receipts and expenditures of his office and perform such other duties as may be properly assigned him.

He may be paid such compensation as the Branch shall approve.

Section 5. Treasurer: The Treasurer shall receive all funds of the Branch and deposit them as directed by the Branch. He shall pay all bills properly presented for payment under the laws of the Branch and shall sign all checks. He shall give receipt for all monies received and shall keep books of account correctly posted and ready for audit. If unable to attend any meeting of the Branch, he shall arrange for a competent deputy. He shall be bonded in a sum not less than the total of funds in his charge. He may be paid such compensation as the Branch shall approve.

Before the first day of September the Treasurer shall remit to the Executive Secretary of the Society the Per Capita Tax of $4.70 due for each member of the Branch; and he shall subsequently remit upon the election of a new member a Per Capita Tax proportionate to the number of quarters remaining of the fiscal year. He shall remit to the Executive Secretary the proceeds of any duly levied Special Per Capita Tax.

Section 6. Librarian: The Librarian shall provide for suitable topics of discussion, speakers, and papers for the meetings of the Branch. He shall have charge of the Question Box and of all magazines, books, and similar property of the Branch. He shall ordinarily be a member of the Educational Committee of the Society.

Section 7. Board of Managers: The Board of Managers shall conduct the ordinary business of the Branch, referring appropriate items to the Branch. It shall supervise the property and expenditures of the Branch and shall be a standing committee for consideration of any matters referred to it. It shall examine the records of all applicatnts for membership and recommend to the Branch the election or rejection, as the case may be, of each.

Section 8. Property: An officer holding property of the Branch shall surrender the said property upon installation of his successor or demand of the Board of Managers.

Section 9. Reports: Every officer shall at the end of his term of office or upon his resignation submit a written report of his official transactions.

Section 10. Resignations and Vacancies: An officer intending to resign shall so notify the Branch President in writing at least one month before the effective date of his resignation. A vacancy in any office shall be filled by the Branch at the first regular meeting after occurrence of said vacancy.

Article VI. Duties of Members

Section 1. Voting: Every member shall vote when required to do so by the presiding officer of a Branch meeting.

Section 2. Misuse of Membership: No member shall use, or sanction the use of, the name or insignia of the Society or his membership in the Society or Branch in the advertising of any product or service. Violation of this provision shall be grounds for expulsion from the Society.

Article VII. Representation

Section 1. Delegates: Each Branch shall be entitled to three Delegates in the Supreme Society, who shall be members in good standing of the Branch and shall be elected by the Branch at least one month before the Annual Meeting. Alternates may also be elected, who may exercise the proxies of Delegates in the absence of the Delegates. Any Branch member holding national office shall automatically be one of the three Delegates of his Branch. The President and Secretary of the Branch shall certify credentials of Delegates and Alternates and shall forward copies of the said credentials to the Executive Secretary in such time as to reach him not later than the fifteenth day of May.

Delegates shall be considered members of the Supreme Society when their credentials have been accepted by the Credentials Committee and the Annual Meeting and shall continue such until their successors shall be elected and accredited.

A Branch may be represented at the Annual Meeting by proxies exercised by Delegates of another Branch; provided that no Branch shall exercise the proxies of more than one other Branch. The said proxies shall be in force only during the Annual Meeting for which they are issued, after due presentation to the Credentials Committee and acceptance by the Delegates.

Section 2. Instruction: A Branch may instruct its Delegates in regard to their votes on the agenda of the Society and the election of Officers, and the Delegates shall vote as instructed for such period as the Branch may direct.

Article VIII. Dues

Section 1. Amount: The minimum annual dues shall be $8.00 and shall be due and payable on the first day of April for the fiscal year ensuing. New members shall on election pay dues for the quarter during which they are elected and for any remaining quarters of the fiscal year.

Section 2. Suspension: Members whose dues are not paid on the first day of September for the fiscal year beginning the first day of April shall be considered suspended until the said dues are paid and during suspension shall not be entitled to the publications or other benefits of the Society.

Section 3. Expulsion: Members whose dues for the previous fiscal year are not paid at the end of any fiscal year may be expelled on recommendation of the Board of Managers and majority vote of the Branch. Such members may be again received into membership only upon due application accompanied by Application Fee and further payment of arrears acceptable to the Board of Managers.

Section 4. Transfer: No member shall transfer from one Branch to another unless he is in good financial standing. The Branch granting a transfer shall pay to the Branch to which transfer is made the sum of eighty-two and one-half cents ($0.825) for each quarter remaining in the fiscal year, including the quarter during which the transfer is effected.

PART III. REVISION

These By-Laws or any part thereof may be repealed, altered, annulled, suspended, or amended by two-thirds vote of all Delegates, either at an Annual Meeting or by letter ballot.

APPENDIX

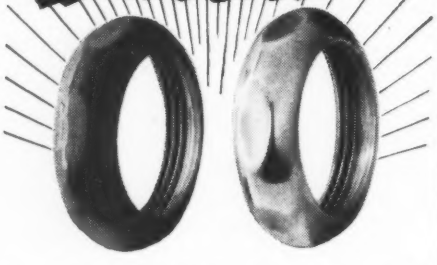
ANNUAL MEETING: ORDER OF BUSINESS

Opening of Convention: Chairman, Convention Program Committee
Address: President, Host Branch
Addresses: Guest Speakers and Others
Final Address of Opening: President of the Society
Turning-Over of Convention to President of the Society: Convention Chairman
Call to Order
Seating of Delegates in Sections Reserved for Them
Roll Call of Officers
Roll Call of Delegates
Introduction of Distinguished Guests
Memorial to Deceased Members
Report of Credentials Committee and Action on Report and Appeals Therefrom
Report of the President
Reports of Vice-Presidents
Report of Executive Secretary
Report of Chairman, Research Committee
Report of Secretary-Treasurer, Research Fund
Reports of Standing and Special Committees
Appointment of Election Committee
Appointment of Standing Committees
Presentation and Reading of Proposed Revisions of Constitution and By-Laws

Final Business Session

Roll Call of Officers
Roll Call of Delegates
Report of Audit of Books
Report of Papers Awards Committee
Report of Law Committee
Action on Proposed Revisions of Constitution and By-Laws
Report of Budget Committee
Action on Budget
New Business
Report of Resolutions Committee
Nomination and Election of Officers
Selection of Place of Convention
Adjournment

ROTO FINISH
Trademark Reg U. S. Pat Office
DOES CUT
DE-BURRING TIME
DIE CASTING COMPANY REPORTS . . . (NAME ON FILE)
"ONE MAN CAN DE-BURR AN AVERAGE OF 12,000 PIECES IN FIVE HOURS."



Unretouched illustration shows die cast plumbing fixture at left before Roto-Finish de-burring and finishing; at right after Roto-Finishing.

Roto-Finish eliminates the great bottleneck in modern production. Hand finishing is slow, inaccurate, and requires a large labor force. Roto-Finish processes quickly, uniformly, and without loss of tolerance, enormous quantities of intricate castings and precision parts of steel, brass, aluminum, magnesium, stainless and nickel steels. Send samples for processing. (Include finished part for guide.) No obligation.

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405 JACOB ST., STURGIS, MICHIGAN

ROTO-FINISH
THE ENGINEERED MECHANICAL FINISHING PROCESS

A. E. S. NEWS

Papers At The 35th Annual Convention American Electroplaters' Society

JUNE 28 TO JULY 2, 1948

According to reports by Mr. Myron B. Diggin of Hanson-Van Winkle-Munning Company, Chairman of the Educational Committee for the Convention, offers of papers have now been received in a number almost sufficient for the time available for presentation.

The subject matters and the quality of the speakers promise a number of interesting sessions. Among the topics to be presented are barrel plating (two papers), plating on plastics, electropolishing, phosphatizing of steel, spray finishing, electrodeposition of bronze and of selenium, plating metals of the future, diaphragm tanks for elimination of roughness, electricity in the plating room, and cost finding and estimating.

A. E. S. Fellowship Open

Project No. 2 in the A. E. S. Research Program, which deals with the determination of impurities in electroplating solutions, has an opening for a Fellow to work under Dr. Earl J. Serfass at Lehigh University. Since this is a part-time arrangement so far as the Project is concerned, it offers a splendid opportunity for a graduate student to work for an advanced degree while earning all or part of his expenses. Anyone interested should write directly to Dr. Earl J. Serfass, Department of Chemistry, Lehigh University, Bethlehem, Pa.

No Per Capita Tax Reductions for Members in the Armed Forces

During the war, many A. E. S. members who joined the Armed Forces stopped paying dues and did not receive the publications of the Society. Since it was desired to keep them as members, the Executive Board ruled that the Branches did not need to pay per capita tax for them. This ruling was subsequently interpreted as an exemption for dues paying, whether these members received publications or not. Upon cessation of hostilities or the end of the emergency, is was assumed that per capita tax payment should be resumed. However, the original provision was still in effect, which complicated the situation.

The Society's Executive Board has now ruled that beginning May 1, 1948 no member of the Armed Forces will be excused from paying dues and that per capita tax will be levied for all.

Convention Reservations

A form postal card will be sent shortly to all members of the American Electroplaters' Society, imprinted as follows:

It is suggested that readers who do not receive this card send their request for space in a letter to Ambassador Hotel, Atlantic City, N. J., with the information indicated on the card.

RESERVATION CARD

Date.....1947

It is my intention to attend the convention of the AMERICAN ELECTROPLATERS SOCIETY, to be held at the Ambassador Hotel, JUNE 28th—JULY 1st, 1948.

HOTEL AMBASSADOR - - CONVENTION HEADQUARTERS

Please reserve for me:

.....Room(s) at the rate of $.....per day, and acknowledge to:

NAME.....

(PLEASE PRINT)

ADDRESS.....

PLEASE CHECK—

EUROPEAN PLAN—DAILY RATES—ROOMS WITH PRIVATE BATH

Single, 1 person $ 6.00 ☐ $ 7.00 ☐ $ 8.00 ☐ $ 9.00 ☐ (No. limited)

Double, 2 persons $ 9.00 ☐ $10.00 ☐ $11.00 ☐ $12.00 ☐ $14.00 ☐

Combinations, 2 doubles and 1 bath for 4 persons $15 ☐ $20 ☐ $25 ☐

Suites (Parlor and Bedroom) $25.00 ☐ $26.00 ☐

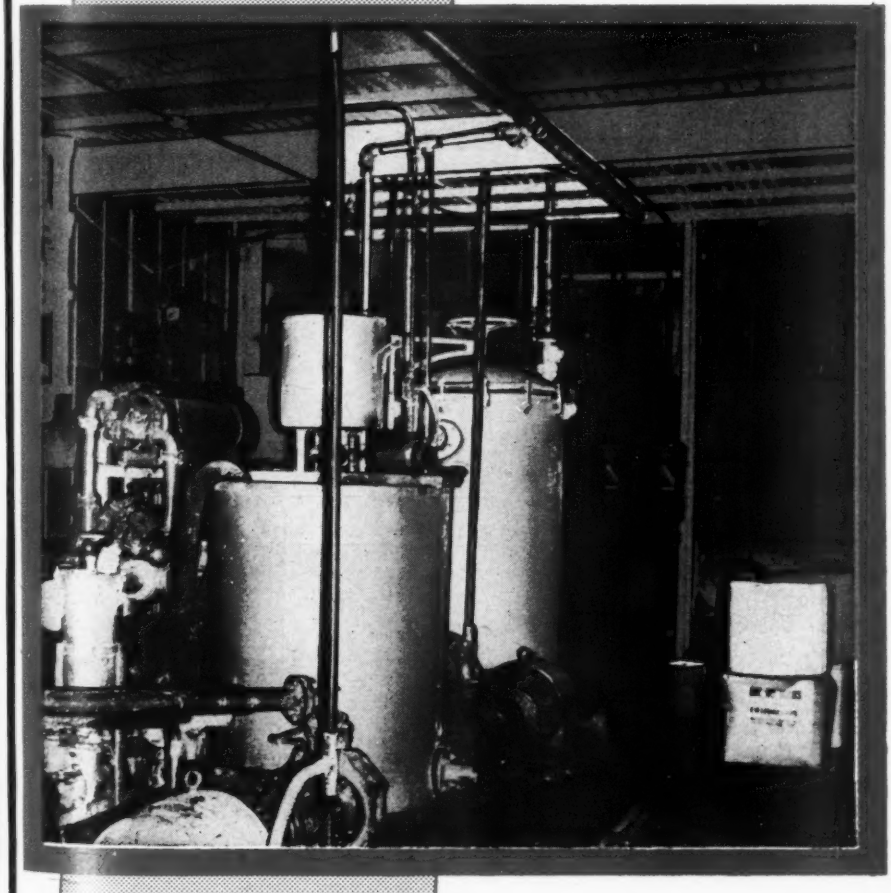
I expect to arrive.....A.M.....date, and depart.....date
P.M.

ALL RESERVATIONS WILL BE ACKNOWLEDGED

Quality Plating

AT LOWER COST!

To obtain quality plating on a production basis requires plating solutions that are clean. The presence of impurities in solutions means an increase in the amount of rejects. Proper filtration is the economical way to increase your production and keep it on a quality basis. Plating shops that operate on a large scale day in and day out, know the value of keeping their solutions free of impurities. That is why Industrial Filters are the first choice of platers who are quality minded.



At left — Industrial filter system on brite nickel installation in a large automotive plant.

This arrangement consists of filter, pumping unit, primer-strainer unit, mixing tank, control valves, fittings and piping.

These features facilitate the convenient use of filter aids and purifying agents, making it an ideal continuous filtration system, and equally as effective for intermittent filtering. Systems are provided for either acid or alkaline solutions.

For 20 years "Industrial" has been building filters for plating solutions that have enjoyed an outstanding reputation for dependability, low upkeep cost, long life and bed rock operating economy. That is why so many platers say "I prefer the Industrial way."

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Membership Report of the American Electroplaters' Society

Elections

BALTIMORE-WASHINGTON BRANCH: Frank H. Gilreath, Joseph F. Grupp, Jr.

CHICAGO BRANCH: John E. Baumrucker, Carl A. Brockman, Lloyd A. Dunn, Ralph J. Fosmacht, Leonard T. Gaiser, T. W. Graff, Martin Gross, Samuel Kaplan, James J. Manderscheid, Jr., Paul E. Pelletier, Jr., Leonard E. Pravel, Sherwood A. Richert, Arthur A. Schuller, M. Woodman Tufts

CINCINNATI BRANCH: Ezra A. Blount, Clarence W. Garrett, William P. Hardig, Lewis S. Lyons, Richard E. Snodgrass

DETRIT BRANCH: Arthur D. Barnett, August J. Becker, Irving W. Butterfield, Fred J. Bryan, Harry C. Fischer, Aram Henesian, Oliver J. Horsch, Esko A. Isotalo, David R. Kitz, Edward D. McAleer, Arthur R. Marshall, Eugene M. Olmsted, Joseph Picarski, James E. Ronayne

GRAND RAPIDS BRANCH: Ralph Brouwer, Lyle McNitt, Lawrence Quirk, C. H. Roach

HARTFORD BRANCH: Howard L. Hancock, John C. Kosmos, Joseph N. Palantonio

INDIANAPOLIS BRANCH: John E. Vaughan

JACKSON-LANSING BRANCH: Herbert C. Craig, Harold W. Dow, Walter O. Dow, Jr., William J. Gavin, Jr., Lawrence M. Henderson, William M. King, Robert J. Rominski, Frederick W. Worgul, Jr.

MILWAUKEE BRANCH: Frederick G. Reich

MONTREAL BRANCH: Gerald Conway, J. P. Courtemanche

NEW YORK BRANCH: Donald H. Bissell, Edmund L. Pagington, Edgar G. Wolff

PHILADELPHIA BRANCH: Alfonso L. Baldi, Jr., Charles D. Briddell

PROVIDENCE-ATTLEBORO BRANCH: H. Stewart Ingerson, Alfred C. Nelson

ROCHESTER BRANCH: Oscar Kraft

SAN FRANCISCO BRANCH: S. Dan Brodie, George H. Cook, Gabriel A. Rodrigues

SOUTHEASTERN BRANCH: Victor J. Baran, Walter D. Clark, Marmaduke H. Dent, Albert C. Lunsford, Thomas B. Royal

SYRACUSE BRANCH: Wistar M. Williams, Stanley W. Wozniak

TOLEDO BRANCH: Arnold A. Muenzer

TORONTO BRANCH: Raymond J. Day, A. Friedlander, Albert T. Middleton, C. T. Stein

OTHER: G. L. Bailey, C. Holmes, Haim I. Krinsky, Andre Vedrenne

BRANCH	Membership May 1, 1947	New Members	Net Change in Membership	Per Cent Net Change
FIRST GROUP				
PITTSBURGH	126	24	+18½	+14.6
BOSTON	156	24	+14½	+ 9.3
PHILADELPHIA	191	33	+16	+ 8.4
LOS ANGELES	195	35	+15½	+ 7.9
HARTFORD	140	14	+11	+ 7.9
TORONTO	136	17	+ 9	+ 6.6
BRIDGEPORT	147	17	+ 9½	+ 6.5
CLEVELAND	190	22	+ 8	+ 4.2
NEW YORK	257	26	+ 9	+ 3.5
DETROIT	418	65	+13½	+ 3.2
CHICAGO	410	61	+13	+ 3.2
NEWARK	253	22	− 1½	− 0.6
GRAND RAPIDS	138	33	− 3½	− 2.5
SECOND GROUP				
ROCHESTER	87	19	+20½	+23.6
ST. JOSEPH VALLEY	89	17	+ 8½	+ 9.5
TWIN CITY	89	9	+ 8	+ 9.0
SAN FRANCISCO	77	9	+ 6½	+ 8.4
ST. LOUIS	96	7	+ 6½	+ 6.8
WATERBURY	116	6	+ 3½	+ 3.0
MILWAUKEE	124	13	+ 3½	+ 2.8
BALTIMORE-WASH.	117	13	+ 3	+ 2.6
DAYTON	95	10	+ ½	+ 0.5
NEW HAVEN	114	10	− ½	− 0.4
PROV.-ATTLEBORO	126	24	− 1½	− 1.2
INDIANPOLIS	103	24	− 1½	− 1.5
BUFFALO	98	9	− 1½	− 1.5
THIRD GROUP				
TOLEDO	55	27	+19	+34.6
CINCINNATI	55	20	+18	+32.7
ADELAIDE	49	14	+13	+26.5
LANCASTER	38	9	+ 6	+15.8
SYDNEY	78	17	+ 9½	+12.2
COLUMBUS	35	9	+ 3	+ 8.6
SPRINGFIELD	49	6	+ 4	+ 8.2
SOUTHEASTERN	43	9	+ 3½	+ 8.1
SYRACUSE	73	5	+ 3½	+ 4.8
MONTREAL	60	6	+ 2	+ 3.3
MELBOURNE	61	..	.....	.....
JACKSON-LANSING	65	12	− 1½	− 2.3
ROCKFORD	64	4	− 2	− 3.1
OTHERS	78	14	+ 1	+ 1.3
TOTAL A. E. S.	**4,891**	717	+273	+ 5.5

Membership, March 10, 1948 5,164

Reinstatements

BALTIMORE-WASHINGTON BRANCH: Leon C. Hasker
CHICAGO BRANCH: C. H. Hanley, Jr.
INDIANAPOLIS BRANCH: A. L. Chesterfield, J. M. Chesterfield
OTHER: Leslie Lodder

Transfers

W. A. Wojnarowski from Chicago Branch; Harold D. Geron from Dayton Branch; Chester W. Smith from Grand Rapids Branch; John De Lucia from Grand Rapids Branch; Bernard Cohen to Hartford Branch; G. H. Carter to Jackson-Lansing Branch; J. A. Gorz to Milwaukee Branch; Laurence W. Ridpath from Newark Branch to Rochester Branch; J. S. Fullerton from Toronto Branch

Resignations

BALTIMORE-WASHINGTON BRANCH: William Bromwell
GRAND RAPIDS BRANCH: R. C. Anderson
INDIANAPOLIS BRANCH: Arthur R. Ferguson
MILWAUKEE BRANCH: Leslie E. Montanye
PHILADELPHIA BRANCH: Philip J. Prang, Jr.
PROVIDENCE-ATTLEBORO BRANCH: Thomas Halliwell
SYDNEY BRANCH: L. W. Ridgeley

Suspensions

BRIDGEPORT BRANCH: David W. Dick, Lawrence M. Santora
GRAND RAPIDS BRANCH: Lawrence Cornelius, Jr., Gerald Dutmers, E. L. Fochtman, Philip A. Joyce, Fred P. Kieft, Victor A. Partz, Albert G. Tracy, H. J. Walcott
LOS ANGELES BRANCH: O. R. Carson, Leslie Crewse, Albert M. Hyde, Fenton Jones, R. M. Thomas, Harry Coyle, Harvey Kelly, Van Parker
PHILADELPHIA BRANCH: Joseph Brosso, W. L. Keating, H. A. Miller
TORONTO BRANCH: George Kushnar, Michael Nesbitt
OTHER: Norman H. Hyam, Leonard S. Larkin, Edward Russell, Harry Walker

Deaths

DAYTON BRANCH: Aloysius Fisher
HARTFORD BRANCH: Anthony Dascoli
SPRINGFIELD BRANCH: Luke D. Mosher

A Correction

A New Method for Magnetic Measurement of the Thickness of Composite Copper and Nickel Coatings on Steel

The reader's attention is called to two errors which occurred in Table I of the above entitled article in the March issue. The per cent deviation for specimen 5 should read +3 instead of 33 and for specimen 6, −6 instead of 66.

Branch News *(Continued from page 390)*

MR. W. S. CIBULSKIS of United Chromium, Inc., Detroit, Mich., gave an enlightening talk on "Barrel Chromium Plating".

G. BERGEMAN, *Secretary.*

TORONTO BRANCH

The regular monthly meeting on February 13 began with the usual dinner. This was followed by a very interesting color movie of Australia, which gave all some different ideas on one of our sister dominions.

PRESIDENT BLANDY read an invitation from the Rochester Branch to attend its Educational Meeting in April. On account of the scarcity of U. S. funds for travel purposes there won't be a very large participation from here, but some of the members are arranging to go and bring back full reports.

ARCHIE SMITH, who is in charge of arrangements for the Regional Meeting in Niagara Falls on May 15, gave a report on the plans for this meeting. Both the educational and entertainment ends appear to be well looked after. The General Brock Hotel will be much more accommodating about reservations if mention is made of attendance of the meeting.

The routine business was followed by a "Quiz Night" organized and operated by Archie Smith. To make sure that one person wouldn't win all the prizes, each person was given a number and had the first opportunity to answer the question with the duplicate number. The judges were ART WEST, WILLIAM PRICE and WILLIAM FINLEY and they, at least, seened to know the right answers.

KERGAN WELLS.

COATING-TIME CUT IN HALF!

...with the New, 100%-Solids Unichrome Coating 218

FIVE HUNDRED RACKS were coated with 218 in half the time usually spent with solvent types—that's the report from a big user of Unichrome Coating 218.

How are such huge savings possible? Because fewer coats are needed. You use only one main coat of 218 over a prime and "tie" coat—the entire job taking about 2 hours.

And not only is this coating *quicker* to apply, it also *lasts longer.* For Unichrome Coating 218 cures to a smooth, elastic, thick jacket that resists all plating and cleaning baths, and won't chip or tear. It will pay you learn more about it. Write today.

(Ask us for the name of a local applicator who will coat your racks with 218 if you don't have a baking oven.)

SEND FOR THIS BULLETIN, which explains how to save time and money in insulating your racks.

UNICHROME

Trade Mark Reg. U.S. Pat. Off.

RACK COATINGS—Products of
UNITED CHROMIUM, INCORPORATED • 51 E. 42nd St., New York 17, N.Y.
Detroit 7, Mich. • Waterbury 90, Conn. • Chicago 4, Ill. • Dayton 2, Ohio • Los Angeles 13, Cal.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 264.

Zialite

Reg. U. S. Pat. Off.

for NICKEL PLATING

The one bath especially designed for plating WHITE METAL ALLOYS including ZINC, LEAD and ALUMINUM. ZIALITE also plates on COPPER, BRASS and IRON.

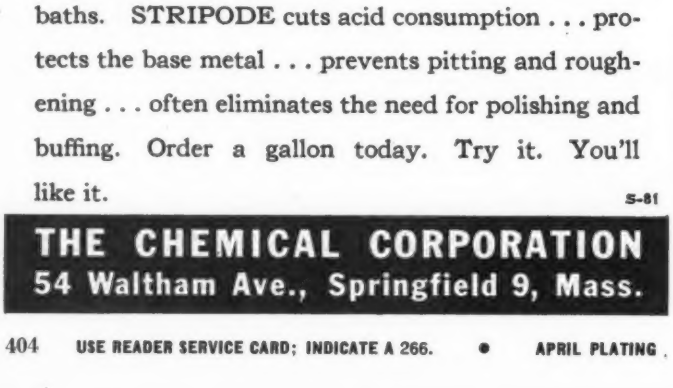
for HARD CHROMIUM

USE
Zialite ADDITION AGENTS
Finer-grained deposits.
Increased throwing power.
Less sensitivity to sulfate content.

ZIALITE CORPORATION
92 Grove Street Worcester 5, Mass.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 265.

STRIPODE
STRIPS FASTER AND BETTER



Nickel comes off in less time when you add STRIPODE to your regular Sulphuric Acid baths. STRIPODE cuts acid consumption . . . protects the base metal . . . prevents pitting and roughening . . . often eliminates the need for polishing and buffing. Order a gallon today. Try it. You'll like it.

S-81

THE CHEMICAL CORPORATION
54 Waltham Ave., Springfield 9, Mass.

Stripping of Electrodeposits

(*Continued from page 352*)

All electrolytic strips require the use of reverse current, usually 6 volt, to deplate the deposit.

(n) *Sodium nitrate*, 4 lb/gal at *p*H 7.6–8.2 and room temperature serves to remove nickel or copper or both from steel at 200 asf (6 volt). It is commonly known as a "steel" strip. Because of the high current density the heating effect is large and a steel cooling coil is required. The tank can be steel and used as a cathode, although steel plates make better cathodes because they can be removed and cleaned. Since the solution is unbuffered, the *p*H must be controlled frequently: raised with caustic soda and lowered with nitric acid. A large volume of solution is recommended to help maintain bath concentration and *p*H. Pitting is encountered with high carbon steel or when the *p*H is out of range, the sodium nitrate concentration or the current density is low. Sludge has to be removed from the tank at frequent intervals. *Never discard the entire bath;* a new one is slow in getting started.

(o) *Sulfuric acid, 60–70 per cent by volume* with or without 1 oz/gal glycerine, is used at room temperature to remove nickel from brass, copper, or copper plated zinc base die castings at 20 asf (6 volt). This strip is quite fast and will attack copper and brass on extended treatment. Hence, to insure against solution of the base metal, the part must be removed as soon as all the nickel has been stripped. Pitting is encountered when the bath is too dilute or the current density or the temperature is too high. If the bath strips too slowly, the current may be too low or the bath concentration too high. The tank may be lead or rubber-lined; lead plates may be used as cathodes.

(p) *Sodium cyanide-caustic soda* at room temperature and a tank voltage of 6 volts serves to remove brass, bronze, copper, cadmium, zinc, gold, or silver from steel. A suitable composition is:

Sodium cyanide	12 oz/gal
Caustic soda	2 oz/gal

This solution is ideal for stripping of gold and silver because they are deposited on the cathodes and may be returned directly to the refinery for recovery. The tank may be made of steel with cathodes of steel plates. When properly controlled, the bath will not etch the steel.

(q) *Reverse cleaner* at 180–200° F is used to remove tin from steel, brass, bronze or copper and chromium from steel or nickel. The tank voltage may be 6–12 volts. If much stripping is to be done, it is not advisable to use a production line cleaner because peeling and blistering may result on the production work. Many platers use a "spent" cleaner for this purpose. On stripping chromium from nickel, the piece must not be permitted to remain in the bath very long because the nickel will become passive and impossible to replate.

Directory

Officers and Branches of the American Electroplaters' Society

A. E. S. OFFICERS

President.....K. M. HUSTON
3208 Tyndale Avenue, Baltimore, Md.

First Vice-President.....S. S. JOHNSTON
Weirton Steel Company, Weirton, W. Va.

Second Vice-President.....A. W. LOGOZZO
Nutmeg Chrome Corporation,
79 Chapel Street, Hartford 3, Conn.

Third Vice-President.....W. J. NEILL
Columbus Metal Products, Inc.,
767 W. 4th Street, Columbus 8, Ohio

Past President.....F. K. SAVAGE
740 Fairfield Road, Kalamazoo, Mich.

Executive Secretary.....A. K. GRAHAM
P. O. Box 168, Jenkintown, Pa.

LOCAL BRANCHES

ADELAIDE, AUSTRALIA. Acting Secretary, G. N. Dixon, G. P. O. Box 428D, Adelaide, Australia.

BALTIMORE-WASHINGTON meets first Tuesday of October, December, February and April at National Bureau of Standards, Washington, D. C., and of November, January, March and May at American Hammered Piston Ring Company, Baltimore, Md. Secretary, Grace Riddell, Chemistry Division, National Bureau of Standards, Washington 25, D. C.

BOSTON meets first Thursday of each month in Hotel Statler. Secretary, Dr. George P. Swift, 53 Galen Street, Watertown 72, Mass.

BRIDGEPORT meets first and third Friday of each month in Barnum Hotel. Secretary-Treasurer, Joseph G. Sterling, 134 Colony Street, Bridgeport 8, Conn.

BUFFALO meets second Friday of each month in Markeen Hotel. Secretary, H. A. Fudeman, 534 W. Ferry Street, Buffalo 13, N. Y.

CHICAGO meets second Friday of each month at 8 P. M. in Atlantic Hotel. Secretary-Treasurer, J. M. Andrus, 3701 Ravenswood Avenue, Chicago 13, Ill.

CINCINNATI meets fourth Wednesday of each month at 8 P. M. in Engineering Society Headquarters, McMillan Street and Woodburn Avenue. Secretary-Treasurer, H. Roper Davis, Box 2052, Cincinnati, Ohio.

CLEVELAND meets first Friday of each month in Cleveland Hotel at 8 P. M. Secretary-Treasurer, George B. Svenson, 2059 Hamilton Avenue, Cleveland 14, Ohio.

COLUMBUS meets first Friday of each month at 8 P. M. in Battelle Memorial Institute Auditorium. Secretary-Treasurer, W. G. Hespenheide, 505 King Avenue, Columbus 1, Ohio.

DAYTON meets second Friday of each month in Engineers' Club. Secretary-Treasurer, Elmar W. Rehme, 505 Commercial Building, Dayton 1, Ohio.

DETROIT meets first Friday of each month in Hotel Statler. Secretary-Treasurer, F. L. Clifton, 16536 Inverness, Detroit 21, Mich.

GRAND RAPIDS meets second Friday of each month at 7:30 P. M. in Rowe Hotel. Secretary, Jacob M. Hage, 1327 Jefferson Avenue, S. E. Grand Rapids, Mich.

HARTFORD meets third Monday of each month in Hotel Bond. Secretary, A. J. Dankevich, 63 Massachusetts Avenue, New Britain, Conn.

INDIANAPOLIS meets first Wednesday of each month at Fox Steak House, 1207 Washington Street. Secretary-Treasurer, James J. Monagle, 1464 N. Colorado Ave., Indianapolis 1, Ind.

JACKSON-LANSING meets second Tuesday of each month at Home Dairy Company in Lansing. Secretary-Treasurer, U. J. Forsyth, 1816 Ada Street, Lansing 10, Mich.

LANCASTER meets second Friday of each month at 8 P. M. in Thaddeus Stevens Industrial School. Secretary-Treasurer, H. Clay Brubaker, 881 Manor Street, Lancaster, Pa.

LOS ANGELES meets second Wednesday of each month at 6:30 P. M. in Scully's Restaurant. Secretary, Dean D. Williams, 2728 W. 42nd Street, Los Angeles, Calif.

MELBOURNE, AUSTRALIA. Secretary, John Dale, %Munition Supply Laborotories, Box No. 4, Ascot Vale, Victoria, Australia

MILWAUKEE meets first Friday of each month in Red Arrow Club, 774 N. Broadway. Secretary-Treasurer, James Durnford, 63 Eastman Street, Oconomowoc, Wisc.

MONTREAL meets first Tuesday of each month in Mount Royal Hotel. Secretary-Treasurer, William L. Glover, 754 Second Avenue, Verdun 19, Quebec, Canada.

NEWARK meets first and third Friday of each month at 8 P. M. in Hotel Robert Treat. Secretary-Treasurer, George Wagner, 1130 S. Long Avenue, Hillside, N. J.

NEW HAVEN meets second Tuesday of each month alternating between Sterling Chemistry Laboratory, Yale University, and Hotel Taft. Secretary-Treasurer, B. J. Gaffney, 40 Filbert Street, Spring Glen, Hamden 14, Conn.

NEW YORK meets second and fourth Fridays of each month in Hotel Pennsylvania. Secretary-Treasurer, Franklyn MacStoker, 25 Princeton Street, Garden City, L. I., N. Y.

PHILADELPHIA meets fourth Friday of each month in Harrison Laboratory Building, University of Pennsylvania, 34th and Spruce Streets. Secretary, Paul Mentzer, Sr., 7242 Bingham Street, Philadelphia 11, Pa.

PITTSBURGH meets third Thursday of each month at 6:30 P. M. in Keystone Hotel. Secretary-Treasurer, R. A. Dimon, 210 Semple Street, Pittsburgh 13, Pa.

PROVIDENCE-ATTLEBORO meets third Monday of each month in Providence-Biltmore Hotel. Secretary-Treasurer, Edward A. Parker, 15 Vale Avenue, Cranston 10, R. I.

ROCHESTER meets third Friday of each month in Hotel Seneca. Secretary, James Weaver, 884 Whitelock Road, Rochester 9, N. Y.

ROCKFORD meets second Monday of each month in Faust Hotel. Secretary, Vern T. Wissen, Forest Hills Road, Rockford, Ill.

SAN FRANCISCO meets second Thursday of each month, alternating between El Jardin Restaurant, 22 California Street, San Francisco, and El Curtola Restaurant, 510 17th Street, Oakland. Secretary-Treasurer, Jack Hite, c/o A. A. Plating Works, 1420 Harrison Street, San Francisco 3, Calif.

SPRINGFIELD meets fourth Monday of each month in Hotel Charles. Secretary-Treasurer, L. R. Fountain, 15 Cortland Street, Springfield, Mass.

ST. JOSEPH VALLEY meets first Wednesday of each month at 8 P. M. in Hotel Elkhart, Elkhart, Ind. Secretary-Treasurer, Harold J. Wiesner, 1016 Osolo Road, Elkhart, Ind.

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ST. LOUIS meets second Wednesday of each month in York Hotel. Secretary-Treasurer, E. R. Hunleth, 4415 Michigan Avenue, St. Louis, Mo.

SOUTHEASTERN meets second Thursday of each month in Robert Fulton Hotel, Atlanta, Ga. Secretary, William Weymouth, 173 Clay Street, S. E., Atlanta, Ga.

SYDNEY, AUSTRALIA. Secretary-Treasurer, John Godfrey, P. O. Box 31, Auburn, N. S. W., Australia.

SYRACUSE meets second Friday of each month in Bowne Hall, Syracuse University. Secretary, M. P. Boland, Jr., 211 Rich Street, Syracuse 4, N. Y.

TOLEDO meets first Thursday of each month at Commodore Perry Hotel, Toledo, Ohio. Secretary, Gaston Bergeman, 703 Pine Street, Fremont, Ohio.

TORONTO meets second Friday of each month in Royal York Hotel. Secretary, Leonard W. Wray, 105 Ronan Avenue, Toronto 12, Ont., Canada.

TWIN CITY meets first Monday of each month, October through June, in Covered Wagon Cafe, Lodge Room, 114 S. 4th Street, Minneapolis. Secretary-Treasurer, Robert L. Buckley, 318 Builders Exchange, Minneapolis 2, Minn.

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April 1, 1948

Dear Reader—

Open discussion of production and technical problems has always benefited participants in meetings of technical and scientific organizations. Many individuals have the same or a related problem, and the answer to a specific problem by a qualified individual or individuals will answer adequately the problems of a substantial number of people.

With this thought in mind, PLATING inaugurated the feature known as "The Question Box" in its initial issue in January. Readers are invited to submit timely, interesting questions for discussion by one of the Associate Editors or some other qualified individual.

It is realized that occasionally answers to these questions may be more a matter of opinion than a statement of absolute fact, simply because certain questions do not lend themselves to factual answers. Discussion is particularly invited in these cases, so that our readers may benefit from the experiences and observations of as many as possible.

So—here is my invitation to each of you to participate in "The Question Box" for the mutual advantage of all of our readers. Publication space is, of course, restricted, but those questions not answered in print will be answered by mail.

Sincerely,

Gustaf Soderberg

Editor.

FUTURE MEETINGS

ROCKFORD BRANCH, A. E. S. Annual Educational Session and Banquet in Faust Hotel on April 3 at 1:30 P. M. and 7:00 P. M. respectively.

THIRD SOUTHERN MACHINERY AND METALS EXPOSITION in Atlanta, Municipal Auditorium, Atlanta, Ga., on April 5 to 8.

NATIONAL ASSOCIATION OF CORROSION ENGINEERS. Annual Conference and Exhibition in Jefferson Hotel, St. Louis, Mo., on April 5 to 8.

PITTSBURGH BRANCH, A. E. S. Annual Ladies' Night Dinner-Dance in Don Metz Casino at 7:00 P. M., on April 8.

THE ELECTROCHEMICAL SOCIETY. Spring Conference in Deshler-Wallick Hotel, Columbus, Ohio, on April 14 to 17.

BOSTON BRANCH, A. E. S. Annual Educational Session and Banquet on April 17 at 2:00 P. M. and 7:00 P. M. respectively.

AMERICAN CHEMICAL SOCIETY. 113th National Meeting on April 19 to 23 in Chicago, Ill.

ROCHESTER-BUFFALO-SYRACUSE BRANCHES A. E. S. Spring Regional Meeting on April 24 in Hotel Seneca, Rochester, N. Y. Educational Session and Ladies' Program at 2:00 P. M., Banquet at 7:00 P. M.

MILWAUKEE BRANCH, A. E. S. Annual Educational Meeting and Banquet in Schroeder Hotel on April 24, at 2:00 P. M. and 7:00 P. M. respectively.

NEW ENGLAND REGIONAL MEETING, A. E. S. in Taft Hotel, New Haven, Connecticut, on May 1. Technical Session in the afternoon, Banquet in the evening.

BRIDGEPORT BRANCH, A. E. S. Banquet-Dinner-Dance in Stratfield Hotel on May 8.

NIAGARA FALLS REGIONAL MEETING, A. E. S., auspices Toronto Branch, in General Brock Hotel, Niagara Falls, Ontario, on May 15. Educational Session at 2:30 P. M., Banquet at 6:30 P. M.

INDIANAPOLIS BRANCH, A. E. S. Spring Dinner-Dance in Indianapolis Athletic Club, on Saturday, May 22.

AMERICAN SOCIETY FOR TESTING MATERIALS. Annual Meeting and Eighth Exhibit of Testing Equipment and Related Apparatus in Book-Cadillac Hotel, Detroit, Mich., on June 21 to 25.

AMERICAN ELECTROPLATERS' SOCIETY, 35th Annual Convention and Industrial Finishing Exposition in Ambassador Hotel and Atlantic City Convention Hall, Atlantic City, N. J., on June 28 to July 1.

THE ELECTROCHEMICAL SOCIETY. Fall Conference in Hotel Pennsylvania, New York City, on October 13 to 16.

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